

JUL 1927

Motorship

Registered in U. S. Patent Office and abroad



U. S. Coast Guard Cutter "Northland"

Length over all 216 ft. 6 in. Breadth, moulded, 39 ft.
Displacement at 15 ft. draft, 2050 tons

BUILT for ploughing through Arctic ice fields, and doing hard work for long intervals far from outside repair facilities, and entirely on her own resources, the Northland must uphold the traditional capability of the Arctic Coast Guard Service.

No finer tribute could be given to marine Diesel power than electric propulsion of this unique vessel from generators driven by two 600-b.hp.

**McINTOSH & SEYMOUR
DIESEL ENGINES**

McINTOSH & SEYMOUR CORPORATION
AUBURN, N. Y.



JULY, 1927

PRICE 35c.

Motorship

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Volume XII

July, 1927

Number 7

Two 8000 Hp. Motor Freighters Planned for Round-the-World Service

Isthmian Lines May Soon Own and Operate Two Large and Up-to-Date Motor Freighters in Round-the-World Service Under the American Flag on Regular Schedule from New York

THE Isthmian Lines are reported, on very good authority, to be considering the construction of two big round-the-world freighters which in size, in power and in equipment will be equal to anything at present operating on this route. We understand that these two ships will have each two sets of Diesel engines with a collective rated horsepower of about 8000 b.hp. They will thus exceed by over 1000 hp. the big Furness-Withy round-the-world freighters operating out of New York, and by about 3000 hp. the new Silver Line fleet of motorships operated by the Kerr Lines Ltd., New York.

The Isthmian Lines maintain at present a round-the-world service with a fleet of steamers, none of which is in its first youth. They are, however, in a somewhat unique position compared with other operators of round-the-world services in that they can nearly always be certain of a full outward cargo of the products from their associated companies' steel mills. These they take to Far Eastern ports and to the Philippine Islands, afterwards continuing on back to New York via the Suez Canal, picking up the usual valuable eastern cargoes at Dutch East Indies ports.

It is perhaps indicative of the tremendous competition now existing on this round-the-world service from New York that the construction of new motorvessels should be deemed necessary.

The Kerr Lines in 1924-25 placed in service a fleet of six 11 knot motorvessels of about 8000 tons deadweight which, naturally, owing to their economical operation on the long ocean hauls began to make their presence felt very soon among the steamer fleets. Furness-Withy was at that time

operating a fleet of steamers somewhat similar to those vessels which the Isthmian Lines are operating at the present time, but they realized very opportunely the potentiality of the motorvessel for this route, with the result that in March, 1925, a con-

tract was placed with the Deutsche Werft, Hamburg, for five 10,000 ton, 14 knot freighters of a particularly advanced and up-to-date type. The placing of these contracts caused no little disturbance in Great Britain at the time, especially in view of the fact that the contracts were placed in Germany, but by those who realized the urgency of the situation it was recognized that the step was a sound one as far as the owners were concerned because at the time no British shipyard could guarantee delivery in the stipulated 10 months, nor could they compete with the price that the German shipyards offered.

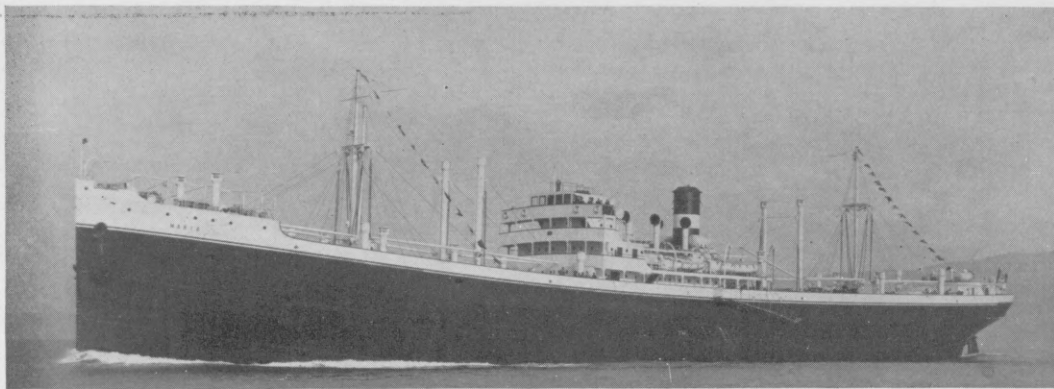
The first of these new vessels made her maiden voyage early in 1926, and this sailing was followed at regular intervals by departures of the other four. With this new fleet the Furness Lines were virtually sitting right on top of the trade route because they could offer shippers in Far Eastern ports reliable transportation at "so many days to New York," that "so many" being less than steamers or existing motorvessels could offer. Kerr Lines did not take this new competition "sitting

down," because immediately after was placed a contract for a fleet of six 14-knot ships, all propelled by single sets of Doxford opposed-piston engines.

The maiden sailing of this new fleet took place towards the end of 1926, and the other units of the fleet are gradually coming into operation. Modification has been made in the last four vessels by the fitting of refrigerated space which will take care of California's produce in its transportation to the Far East. Furthermore, the effect of this has been cumulative. Not only is the Furness fleet rivaled by a

powerful fleet of 14-knot vessels, but the existing 11-knot fleet is now released for a new service from Los Angeles and San Francisco to the Dutch East Indies and India, thus placing West Coast ports within about 50 days of a huge potential Indian market.

This is a brief sketch of a series of events covering 3½ to 4 years, but it goes to show what rapid development has taken place in that time. Now comes the announcement that the Isthmian Lines are going to build these two 8000 hp. freighters. It is believed that they have had such ships under consideration for a considerable period of time, but up to the present nothing definite has been done in this matter. It is to be hoped, for the sake of American motorship development, that the work will be quickly put in hand. It is only natural to suppose, of course, that the vessels will be built at the Federal Shipyard, Kearny, N. J., in view of the connection between the two concerns, but there remains the interesting question of what type of engines will be selected and what design improvements, in line with modern



Representative of modern fast motorshipping, Ms. Maria employs latest arrangement

motorship practice, will be worked into the ships. Also, it is to be most definitely hoped that the owners will not allow themselves to be swayed by the suggestions of high pressure turbine enthusiasts. The high pressure turbine represents the opinion of many well-informed people, the dying kick of steam, and it has yet to prove itself more economical than the best type Diesel. It is definitely up to the Diesel engine builders of this country to show what a good proposition they can put up to the owners of these new proposed vessels.

With 8000 hp. they will be more powerful than any freight carrying motorships yet built for general cargo work.

It is to be hoped that the designers will not allow themselves also to be swayed by advocates of old steamer type arrangements. The modern motorship places all its accommodations in one structure, usually just abaft amidships. The older type motorship follows the steamer arrangement of having two structure erections, one for the deck officers and one for the engineer officers around the casing.

This was fully discussed in the May issue of *MOTORSHIP* in the first article of our series entitled "Motorshipping Marks New Era in Sea Transportation Business."

Furness-Withy's round-the-world motorships really represent the highest progress in this direction. The Kerr Line motorships follow the old steamer arrangement.

Domestic Diesel engine builders are following the Isthmian Line's next move with no little interest because the contracts represent a valuable piece of work.

Why not Coastwise and Sound Motorships?

A CONTRACT has recently been placed with the Newport News S. B. and D. D. Company by the Chesapeake Steamship Company of Baltimore, for the construction of a Sound steamer of 261 ft. in length and developing about 2300 i.hp. This ship is designed for service on Chesapeake Bay between Baltimore, Hampton Roads, and Norfolk, on which it maintains a night schedule. Its constructional features call for no special comment other than the fact that it is an Isherwood longitudinally-framed vessel. It is a matter of considerable import, however, that at a time like this, when the Diesel engine is demonstrating its economy in every branch of the world's mercantile marine, such a contract should have gone to steam, and we cannot help wondering how far the Diesel industry definitely went out to secure this contract for itself. We have in the back of our minds a feeling that some of the Diesel engine builders miss much potential new work because they do not definitely make a determined fight to tackle new types of ships for the application of their engines.

This contract is the first of this particular nature to be placed for some little time. When the last similar contract was placed the Diesel engine was not in the position in which it is today, but the owners of the new vessel, unless tightly wrapped in the cloying bandages of conservatism, must invariably have reflected on the possibilities of Diesel engines for their new ship. We wonder how far the Diesel engine builder helped them out in this matter?

A power of 2300 indicated would be difficult of obtainment in many ships not in the Sound class, but one of the beauties

of this type of ship, from the Diesel engineering viewpoint is that the main engines and boilers, i.e., the machinery, are arranged in a well and the main deck of the ship does not cover the engine space, as is the case with so many other ships. Therefore, considerations of height of engine do not enter into the matter to the same extent as in other ships. The existing ships of this type operating on Chesapeake Bay are single-screw vessels and there are several makes of engines in this country which would be capable of developing this power within a reasonable space, in which connection it is interesting to note that either one of the two engines fitted in the railroad car ferry which we describe on page 535 of this issue is capable of developing 1700 to 2000 i.hp. at about 180 r.p.m. These are 8-cylinder Burmeister & Wain Diesels. The 8-cylinder Busch Sulzer engine, four of which are to be fitted in the tanker *DISTRICT OF COLUMBIA* for driving electric generators is moderately rated at 1000 b.hp. at 275 r.p.m. Or again the Sound ship is possibly a very ideal case for the adoption of geared Diesel drive, which allows the main power to be split up between two prime movers. Such an arrangement gives an opportunity for an even larger number of makes of engines developing up to about 900 to 1000 i.hp. apiece. Diesel-electric drive for such a ship would appear to have been ruled out on the ground of excessive weight.

In ordering ships of this type for service in Chesapeake Bay, owners perhaps are naturally influenced by the cheap coal which they can pick up at Baltimore, but even so, with the Diesel engine burning one-quarter of the amount of fuel that the steam engine burns and with all its

other advantages including lack of standby charges—an important matter in boats of this nature—it certainly should have been well worth consideration.

The object of this article is to draw the attention of everyone interested in the manufacture and fitting of Diesel engines to the desirability of actually going after the Coastwise, Bay and Sound field. As we point out in our articles on page 527 entitled "Motorshipping Marks New Era in Sea Transportation," the coastwise field is untouched in this country, which has the largest domestic mercantile marine of the world, while in all other important maritime countries the coastwise motorship is represented.

Piquancy is added to the placing of this new contract with steam, by the fact that the Pennsylvania Railroad is constantly rumored to be contemplating the construction of a new vessel for the Norfolk-Cape Charles ferry. This service is at present maintained by two venerable old steamers of smaller size to the largest Baltimore-Norfolk ships. Rumor also has it that Diesel engines will be definitely considered for this ship. This rumor alone shows that interest in the Diesel engine is spreading to fields which have hitherto been regarded as coming within the realm of steam.

It is definitely up to the Diesel engine builders to follow up every possible lead in the direction of new ship types to be conquered even in cases where the owners are wedded to steam. Most domestic Diesel engines have such good records behind them that it is largely a question of sound publicity and salesmanship to overcome the prejudices of existing retrograde owners.

This Pulverized Coal Business

MUCH is still heard in marine circles about the possibilities of pulverized coal. There is a great deal to be said for it and many thinking engineers have come to the conclusion that it is much more economical in the long run to burn pulverized coal under boilers than to burn fuel oil. These people think that if fuel oil be burned at all it should be in the cylinders of internal combustion engines. There is much to support this. It has yet, however, to be definitely shown that a power plant fitted for burning pul-

verized coal is more economical than a Diesel plant. Some excellent experimental work is being carried out in this direction and it represents a real creditable attempt to place a dying man on his unsteady feet.

We were discussing recently the question of fitting pulverized coal to harbor craft with the Marine Manager of a well known railroad. The point that struck him as unfavorable was the space that the whole plant would occupy, apart from the fact that there was a danger of spontaneous combustion from the coal, as well as

the fact that he still had all his bunkering delays and the delays of filling up with water, which are to be found in existing steam towboats. Similar disadvantages militate against its being fitted on ocean-going ships with the further disadvantage that the plant necessary for pulverized and for stoking increases with the size of the ship. If pulverized coal can compete with the Diesel engine its competition will merely stimulate Diesel engine builders to even greater economies than those obtaining at present.

Newest Round-the-World Service

Converted Ms. West Cusseta Makes Highly Successful Maiden
Round Trip of 20,896 Miles in Roosevelt Lines Service

CONVERTED Shipping Board freighter WEST CUSSETA is the first of the motorships operated by Roosevelt Lines, Inc. to return to New York after a maiden trip of some 20,896 miles. She and her sister ships TAMPA, UNICOI, WEST HONAKER, CROWN CITY, SAWOKLA and CITY OF RAYVILLE are all operating on a round-the-world schedule from New York back to Boston, outward via Panama and home-ward by Suez. All the ships of the fleet are now outbound from New York at vari-

Lines, who have recently established a pas-senger department. For \$800 the voyager who is interested in seeing places, rather than in passing through them at high speed, may visit parts of Australia and India, and pass through both of the two great trade lane canals of the world in doing so. Among the ports of call, although some sailings do not include them all, are Sydney, principal commercial gateway of Australia which possesses the finest land-locked harbor in the world and is a city

mantle. In India, the voyager may see Calcutta, next most populous city to Lon-don in the British Empire; Madras, Co-lombo, and Bombay with a harbor having an area available for shipping 14 miles long by 5 miles broad. Thence after India ships cross the Arabian Sea to the Red Sea and on to the Suez Canal, whence, after passing through the Mediterranean, they make the Transatlantic passage to Boston. The total trip requires about 5 months, and the passenger may perform the voy-

List of Converted U. S. Shipping Board Motorships to June 1927

	SHIP	DWT. CAPAC.	MAIN ENGINE	MAKER	HP.	WHERE CONVERTED
1	Tampa	9,120	4 cyl., d. a., 2 cye.	Worthington	2,900	Newport News
2	Unicoi	8,230	4 cyl., d. a., 2 cye.	Worthington	2,900	Newport News
3	West Honaker.....	8,006	6 cyl., s. a., 4 cye.	McIntosh & Seymour	2,700	Bethlehem (Fore River)
4	West Cusseta.....	8,006	6 cyl., s. a., 4 cye.	McIntosh & Seymour	2,700	Bethlehem (Fore River)
5	Crown City.....	8,006	6 cyl., s. a., 4 cye.	McIntosh & Seymour	2,700	Bethlehem (Fore River)
6	Sawokla	9,125	6 cyl., s. a., 2 cye.	Busch-Sulzer	2,900	Newport News
7	City of Rayville.....	9,125	6 cyl., s. a., 2 cye.	Busch-Sulzer	2,900	Newport News
8	City of Dalhart.....	9,125	6 cyl., s. a., 2 cye.	Busch-Sulzer	2,900	Newport News
9	Yomachichi	9,125	6 cyl., s. a., 2 cye.	Busch-Sulzer	2,900	Newport News

Ships Completing Conversion with Modified Passenger Accommodations

10	Seminole	*	4 cyl., d. a., 2 cye.	Hooven Owens—M.A.N.	3,300	Todd Sb. & D. D. Co.
11	Wilscox	*	4 cyl., d. a., 2 cye.	New London—M.A.N.	3,000	†
12	West Gramma	*	4 cyl., d. a., 4 cye.	McIntosh & Seymour	2,700	Bethlehem (Fore River)

* Not yet completed. † Conversion not yet allotted.

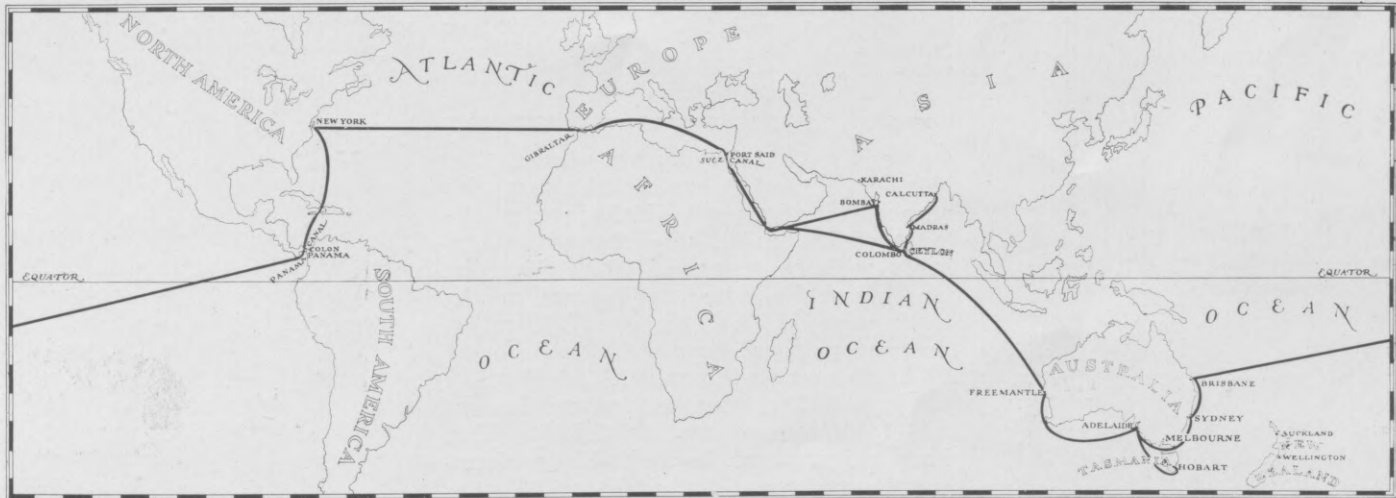


Chart shows Round the World Schedule of 26,540 miles upon which converted Shipping Board freighters now operate
From the 1927 MOTORSHIP MANUAL

ous stages of this journey. Ms. WEST CUSSETA, however, did not complete the round-the-world trip but was specially scheduled to make a maiden voyage from New York to Sydney, N.S.W., and Melbourne, and back again to Boston. When she sailed from New York on June 11, however, she was on her normal round-the-world sched-ule via Australia and India.
Before considering in more detail Ms. WEST CUSSETA's maiden voyage it is worth while mentioning this new round-the-world service in which the converted Shipping Board vessels are engaged. The service has an additional interest by virtue of the fact that accommodations for 14 passengers are arranged on each of the ships and that a definite attempt to attract passengers to this route is being made by the Roosevelt

Schedule for Roosevelt Lines Motorships

ROUTE	DISTANCE (MILES)	TIME (DAYS)
New York to Panama.....	2012	8
Panama to Brisbane or Syd- ney	7700	29
On Australian Coast and in ports	2665	30
Fremantle to Calcutta	3677	14
On Indian Coast and in ports	2136	33
Bombay via Suez to New York	8350	36
Total round the world....	26540	150

with a population of more than a million; Melbourne with a population of over 800,-000, Adelaide, Brisbane, Perth and Free-

age in cabins as well fitted and as com-fortable as many found on big trans-ocean liners.
The service is really a combination of two original Shipping Board steamship services, the New York-India service via Suez and the New York-Australia wool service via Panama. Both of these serv-ices were originally maintained separately by steamers, but the economy of the Diesel has made it possible to link the two to-gether and keep the motorships going west-ward around the world all the time. Fur-thermore, for those portions of the voyage in which cargo shipments may be slack there is always the added advantage to the operators that the ships have passenger ac-commodation. It should be quite an easy matter to develop a well patronized pas-

senger service on this route for travel between way ports, as well as for tourist travel over the greater part of the route.

The original steamer Australia service proceeded from New York to Brisbane, Sydney and Melbourne via the Panama Canal. The original New York-India service proceeded via Suez Canal either to Karachi and Bombay, or to Madras and Calcutta. The link, therefore, which the economy of the motorships has made possible is that portion of the route between Adelaide and Colombo via Freemantle. The motorships suffer no bunkering delays en route because bunkering once at Panama serves to carry them round-the-world and back to Boston, leaving even then in the tanks sufficient fuel to carry them from Boston to New York, to use the auxiliary generators in port, and then to take them from New York back to Panama.

The maiden voyage of ms. WEST CUSSETA was, as has been mentioned, from New York to Sydney and Melbourne and then back to Boston whence the ship proceeded to Pier 4, Army Base, Brooklyn.

The clean appearance of the engine-room and the lack of any mess or dirt from overhauling, such as one might easily expect after a long voyage of this nature was particularly noticeable.

Ms. WEST CUSSETA sailed from New York on January 26, making the 1955 miles from Ambrose Channel Light to the Canal at an average speed of 11.3 knots. The r.p.m. of the 6-cylinder McIntosh & Seymour Diesel was 89.7. The 8041 miles from Panama to Sydney, N.S.W., was covered at an average speed of 11.9 knots with an average r.p.m. of 92.5. This, the longest leg of the voyage, was covered without a



Ms. West Cusseta at Sydney, N. S. W.

Characteristics of Ms. West Cusseta

Gross tonnage	5,428 tons
Net tonnage	3,374 tons
Length overall	423 ft. 9 in.
Length b. p.	410 ft. 0 in.
Beam, molded	54 ft. 0 in.
Depth, molded to upper (main) dk.	29 ft. 9 in.
Displacement, load	12,086 tons
Draft at above	23 ft. 11 1/4 in.
Displacement, light	4,080 tons
Draft, light	8 ft. 10 in.
Power, main engine	2,700 b.h.p.
Service speed, about	11 knots
Endurance	17,600 miles
Total deadweight capacity	8,006 tons
Fuel oil, double bottom	885.5 tons
Lubricating oil	3,970 gal.
Fresh water, total	214 tons
Cargo deadweight capacity (full endurance)	
Cargo deadweight capacity (half endurance)	
Cargo space capacity (bale) ..	393,000 cu. ft.
Cargo space capacity (grain) ..	386,449 cu. ft.
Deep tanks (liquid)	4,077 bbl.
Deep tanks (grain)	22,894 cu. ft.
Ballast water (peaks)	350.2 tons
Ballast water (deep tanks)	654 tons
Ballast water (double bottoms) ..	1,021 tons

stop and with a fuel consumption of 31.4 bbl. of oil per 100 knots. The coastwise voyage from Sydney to Melbourne, a distance of 535 miles, was covered at 11.7 knots with an r.p.m. of 88.9. The distance from Melbourne to Panama on the track taken by the ship was 7972 miles, the average speed over the distance being 11 knots and the r.p.m. 91.15. The fuel consumption on this, the second longest leg of the voyage, was .292 lb. per i.hp. hour all purposes, a creditable performance in every way. From Panama Canal to Boston, a distance of 2131 miles, the speed

was 11.9 knots, this of course being due to the effect of the Gulf Stream. The r.p.m. similarly was up to 92.9. The fuel consumption on this run was .318 lb. per i.hp. hour. The run home from Boston to New York, 262 miles, was made at 10.9 knots and 95.9 r.p.m., and the ship reached New York on May 14. The maneuvering of the engines was excellent throughout the entire voyage, particularly in the Panama Canal.

Mr. Pancott, chief engineer of the vessel on her maiden trip, has now been promoted to the WILLIAM PENN, allocated to and now operated by the Roosevelt Lines.

We have not been able to obtain figures for the power developed on the outward run as far as Melbourne, but on the run home from Melbourne to Panama Canal the main engines developed 3712 i.hp.

When it is considered that ms. WEST CUSSETA and her sister vessels were originally uneconomically steamers with an entirely problematic value for the stringent requirements of modern sea transportation, and when we examine the above figures in the light of modern ship performance, it will be seen what an extraordinarily fine job has been done by all concerned with these Shipping Board conversions. The ships as they exist at present, although not as fast as some vessels on round-the-world trade routes, make up for what may be a slight deficiency in speed by an efficiency in cargo handling appliances, passenger accommodations, crew accommodations and excellency of navigational equipment not found in many motor freighters today. Even some of the best 14 knotters are not fitted with gyro compasses and other refinements which are rapidly becoming regarded as indispensable.



Unloading at Melbourne



Crossing the line

New Furness Pacific Motorships

One sailing every 10 days between the United Kingdom and Pacific Coast ports by the ships of the Furness line will be inaugurated on September 9 with departure of the new motorship PACIFIC RELIANCE from Manchester. Increased frequency of service will be made possible by the acquisition of six new motorships recently completed in the company's own shipyards. These ships are named the PACIFIC RELIANCE, PACIFIC ENTERPRISE, PACIFIC PIONEER, PACIFIC EXPORTER, PACIFIC GROVE and PACIFIC PRESIDENT.

Each vessel has 10,000 tons dead weight, a length of 450 feet, 60 ft. beam and twin screws propelled by Burmeister & Wain engines. Each will have a speed at sea of 13 knots. There will be 75,000 cu. ft. of

refrigerated or aircooled space and also passenger accommodations for a limited number. When the new ships are in service the company will have 9 motorships in this trade instead of three as at present. The steamers now in the trade will presumably be gradually withdrawn because they will obviously be unfitted to sail alongside modern fast motorships. The existing motorships, it should be noted, are 11 knot Doxford engined ships.

A Motor Warship

The British cruiser-minelayer ADVENTURE has an extensive Diesel plant for propulsion when cruising. The ship has a displacement of 7260 tons. The main engine are Parsons turbines of 40,000 s.hp. for a speed of 27.75 knots. The Diesel plant will

always be used to drive the ship when a moderate cruising speed is desired. No particulars of the Diesel machinery are available other than that it was built by Vickers Ltd. to Admiralty specifications. The maximum fuel oil capacity of the ADVENTURE is 1550 tons, and she is expected to have the widest radius of action of any ship in the British navy. Although not the first motor warship, apart from submarines, to be built for the British Navy since several monitors with internal combustion engines were constructed early in the war—ADVENTURE is the first vessel of cruiser type to have Diesel engines for propulsion, even though they are subsidiary to the steam plant. ADVENTURE has a total length of 520 ft., with a breadth of 59 ft. over the bulges.

Motorshipping Marks New Era in Sea Transportation Business

The Coastwise and Fast Passenger Packet Ship Has Now
Its Diesel-powered Representatives on All Key Routes
in Many Parts of the World

IT was mentioned in the last article of this series that one of the big problems confronting the Diesel engine industry is that of providing the small fast ship with a high power within very restricted space. This statement needs qualification and may well form the subject of further discussion.

In America the matter is worthy of study because a very fruitful field presents itself to engine builders in the fast coastwise passenger and freight ships which operate out of New York and Boston to points North and South and out of Portland, Ore., Los Angeles, and San Francisco. The North American Continent with over 28,000 miles of coastline is very obviously a continent upon which fast coastwise transportation, suitably "sold" to the public is a necessity turned into a luxury. It is essentially a live, important business.

In Great Britain the application of Diesels to high-powered vessels operating across the English Channel and the southern portions of the North Sea is the academic mecca of all imaginative designers and naval architects and is likely to remain so for a number of years because of the ease and cheapness with which the railroad companies, who own and operate the majority of these services, can obtain their coal. These ships have designs—unfortunately for passengers*—modeled upon those of torpedo boat destroyers and powers (12,636 i.hp. for 21.5 knots in a hull 321 ft. long to quote one extreme example), very high in proportion to their size and are likely to remain somewhat of a powering problem until very high powered, light, short, trunk piston Diesels can be produced which will give about 5000 hp. per 6 or 8 cylinder single acting unit, not exceeding in height about 12 ft., and in weight per hp. that of the lightest of high pressure turbine installations and boilers. A similar, modified, type of ship is found on Puget Sound.

The Australian coastline, the eastern

seaboard at any rate, presents similar problems to the American seaboard and demands similarly a large moderately fast ship capable of transporting passengers and freight at from 14 to 18 knots. Australia has been the first to appreciate the applicability of the Diesel engine to coastwise work and, indeed, as long ago as 1913 the Western Australian Government placed

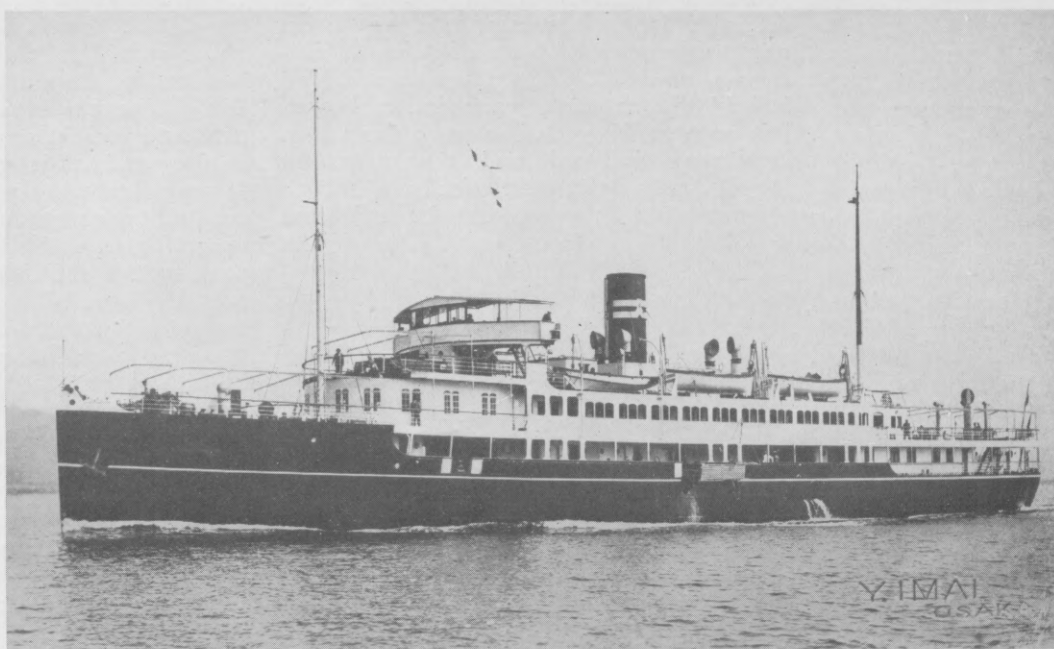
its first motorship, a large cargo carrying ship, in commission. Since 1925 several important coastwise motorships have been placed in commission, including one large passenger carrying ship. All of these are well worth studying in view of their parallelism with U. S. ships and services.

In Germany we have an almost perfect example of the fast coastwise motorship, in two 3500-5000 hp., 15-17 knot ships completed in 1926 to the order of the German Ministry of Transport to provide regular service between Germany and Eastern Prussia now separated by the Polish Corridor. Originally it was decided to build the ships as twin-screw steamers, with an average speed of 15 knots. An essential feature of the service was that connection with railroad schedule should be made between Koenigsberg and Stettin. No loss of time could, therefore, be allowed during the voyage.

Speed, in consequence, has to be increased considerably for short periods in order to allow for bad weather, fog, or ice. Reciprocating steam engines and boilers were found to be too heavy, and the idea of turbines with watertube boilers was turned down as uneconomical and unsuited to the general operating conditions.

A twin-screw 4-cycle Diesel plant was, therefore, chosen, the power of which can be considerably increased by superchargers driven by exhaust-gas turbines. By this arrangement it was guaranteed that the distance between Swinemunde and Pillau, packet ports respectively for Stettin and Koenigsberg, could be covered in 17 hours. The average speed required for that purpose is 15 knots, and this speed may be increased to 17 knots if necessary.

For propulsion there are two 4-cycle M. A. N. Diesels each with 10 cylinders, designed to develop 1,750 b.hp. per unit at 260 r.p.m. Each engine has an output of 2,500 b.hp. when supercharged, in which case the vessel can maintain 17 knots. There is a supercharging blower for each engine, coupled to a gas turbine, into which the exhaust gases from the engine are delivered at a pressure of 7 lb. per sq. in. Con-



Representative of modern coastwise motorshipping, this ship has 1600 hp. and 14 knots speed

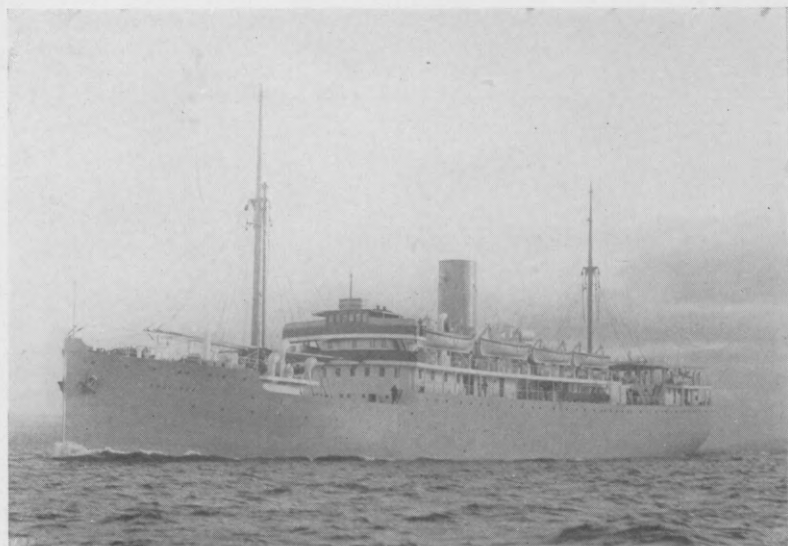
"MOTORSHIPPING"

THIS is the third of a series of specially prepared articles of which the first two appeared in the May and June issues of MOTORSHIP. They are all units of a composite whole which seeks to show something of the change which the Diesel engine has brought about in the shipping world. That is why we have chosen the title "Motorshipping Marks a New Era in Sea Transportation." Had the author selected the single word "Motorshipping," he would have been equally correct and far more succinct.

Motorshipping does, very definitely, mark a new era in sea transportation, and we are only just beginning to recognize this. The closer the "close-up" on modern shipping conditions one gets, the more one realizes how slow yet sweeping this change is.

In future articles such matters as the Conversion of Steamers, Specialist Motorships, The Psychology of the Motorship, Motorship Trade Routes, will be dealt with.

* See article entitled, "Concerning Cross-Channel Ships"—a critical study in the "Liverpool Journal of Commerce," October 11, 1926.



EXAMPLE B

Australian coastwise motorliner Koolinda, 5100 hp.



EXAMPLE E

Panama Mail Motorship City of Panama, 2150 hp.

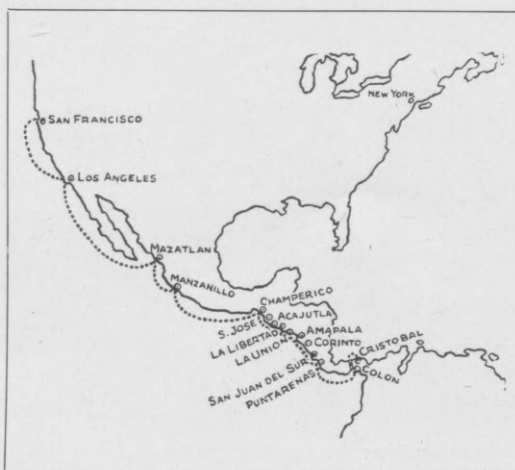
sumption of the two engines when developing a total of 3,500 hp. is 0.419 lb. per b. hp.-hr. including the auxiliary machinery. Equipment of the ships is in conformity with up-to-date practice for modern motorships and includes radio equipment, submarine signal apparatus, searchlight, direction finder and gyro compass.

These two ships are the nearest approach to the fast passenger vessel typified by the cross channel ships on North Sea and English Channel service and on the American coastlines by the Pacific "fliers" like the YALE and HARVARD (10,000 i. hp. and 23 knots on a length b.p. of 376 ft.) which cover the 368 miles between San Francisco and Los Angeles with intermediate stops at Wilmington and Long Beach in 19 hrs.

They represent a very important development because they are a definite attempt to apply the Diesel engine to the comparatively small high speed ship for fast overnight runs. They carry 1403 passengers when on day schedule and 1158 passengers at night. This number is 23 in excess of the number carried by a 350 ft. 5875 ton gross turbine passenger packet operating (during the day) at 16 knots on Puget Sound between Vancouver, Victoria, and Seattle. No freight is carried on these German ships, and passengers are carried in inside cabins in the usual European

"crowding" fashion which would not be desirable for modern American travel and might be avoided by an adoption to European needs of the Sound ships' "gal-leried" system of accommodation layout, but even so, they do the work for which they were designed, and, thanks to the Diesels, they do it economically.

The fastest ships in coastwise and cross



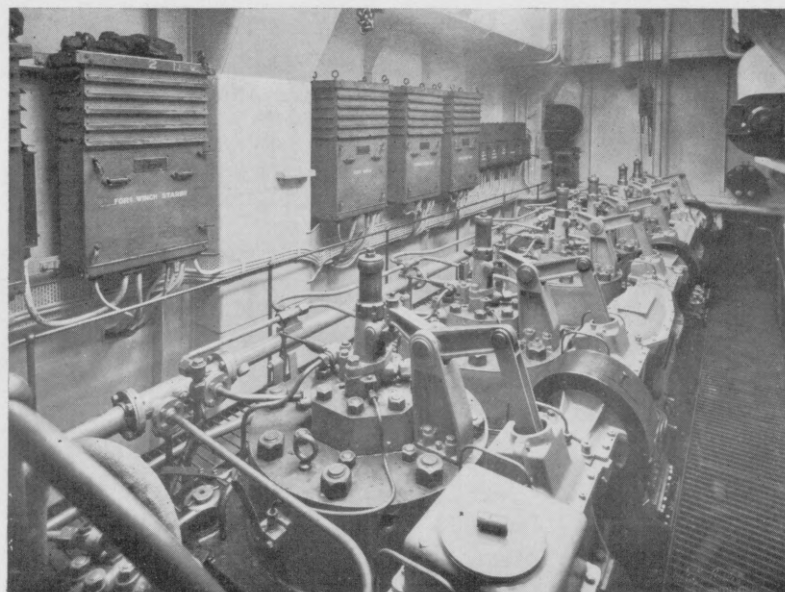
Route of the Panama Mail Motorships

channel service are waiting for a very light, high speed, low, high cylinder output Diesel. Weight is the enemy to fight. The coastwise fast and moderately fast motorship, however, is a definitely estab-

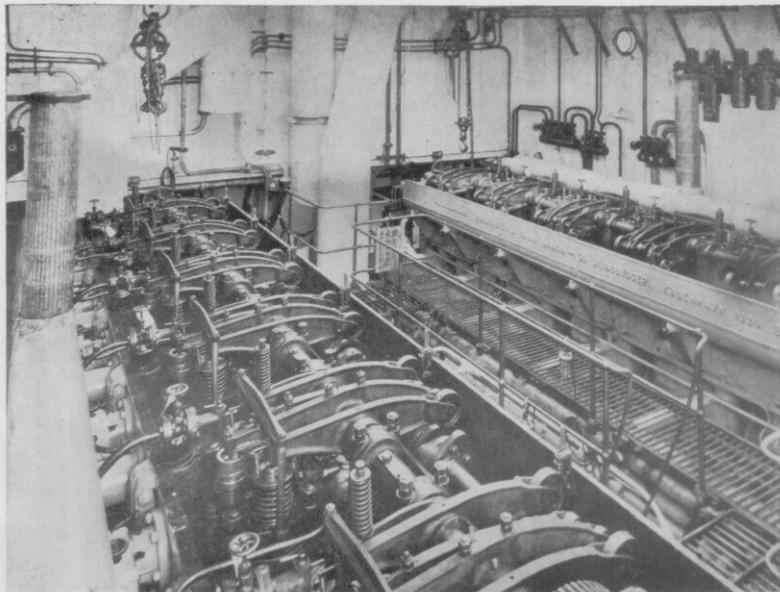
lished factor on many coastlines except on the U. S. coastlines. This country has more coastwise activity than any other country in the world and a greater need for economical transportation of passengers and freight coastwise than any other country and yet it has practically neglected to investigate the possibilities of the Diesel for its passenger carrying craft which, operating on coasts, sounds, and bays present such a fruitful potential market for just the type of engine she can produce best and cheapest—the engine up to about 1500 hp. to 2000 hp. per 6 or 8 cylinder unit. The irony of the situation lies in the fact that American coastwise ships of awning deck type and sound steamships are designed with much superior arrangement to many of their European motor driven prototypes. This at once removes many of the restrictive factors to which existing motorships are subjected.

In many ways this problem of fitting large powers within a small space is more fascinating than that of placing high powers in big passenger liners. It certainly is a bigger and perhaps more fruitful field for the maker of smaller engines.

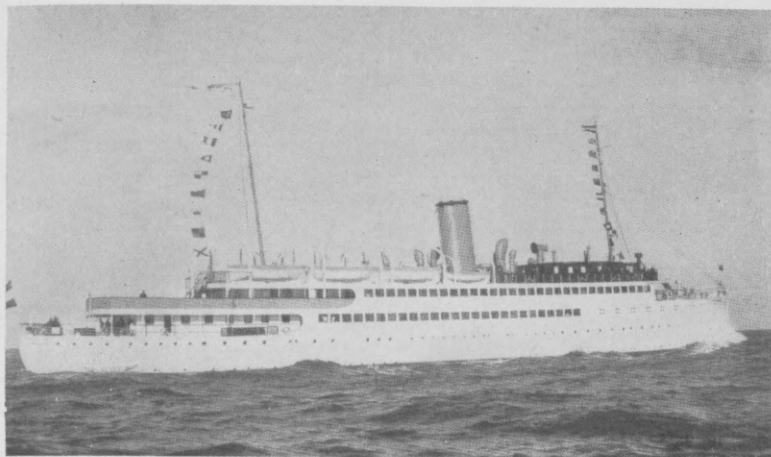
Because, in all marine matters, developments of the future depend largely upon what has gone before, it is necessary to take stock of existing practice. Look carefully at the two tables in which are



Single-acting 2-cycle Diesels in a 1100 hp. coastwise motorship



Single-acting 4-cycle Diesels in a 1600 hp. coastwise motorship



EXAMPLE L
German coastwise "Flier" Preussen, 5000 hp.



EXAMPLE G
East African "Coaster" Dumra, 1000 hp.

listed a carefully selected bunch of passenger vessels built for coastwise and short sea runs during the years 1921-27. They vary in size, speed, and power all the way from example A which by virtue of size comes almost within the ocean-going passenger liner category, down to example R which in size and power is comparable with some of the "coasters" operating on the British Coast. The example with the highest speed is the PREUSSEN—L—which, with 17 knots given by supercharged machinery, is unquestionably the "model" design for future high speed ships. Her 10-cylinder engines appear perhaps rather alarming at first, but remember that the engines are extremely moderate in dimensions for crosshead units, length being their most disagreeable feature. The engine room arrangement is neat and the auxiliary machinery is cut down to the minimum and arranged in a separate room. The power is spread as it were lengthways—fore and aft. The cylinder dimensions are moderate, stroke being a little greater than bore. They are high speed machines turning at about 260 r.p.m. maximum. A comparison here is worth while with example F in which two similar machines of 21 in. bore by 21 in. stroke are fitted turning at 200 r.p.m. and giving the ship a speed of 15 knots with 2800 b. hp. An examination of the comparison table of steamers shows that the power for the 17 knot steamer comes within the range of established Diesel powers and so do the dimensions. Coupled with this are the

enormous economies of Diesel propulsion.

In future designs we may have to get away from the habit—a long established one—of fitting two or three generating sets. They are unnecessary, and absorb

COASTWISE MOTORSHIPPING

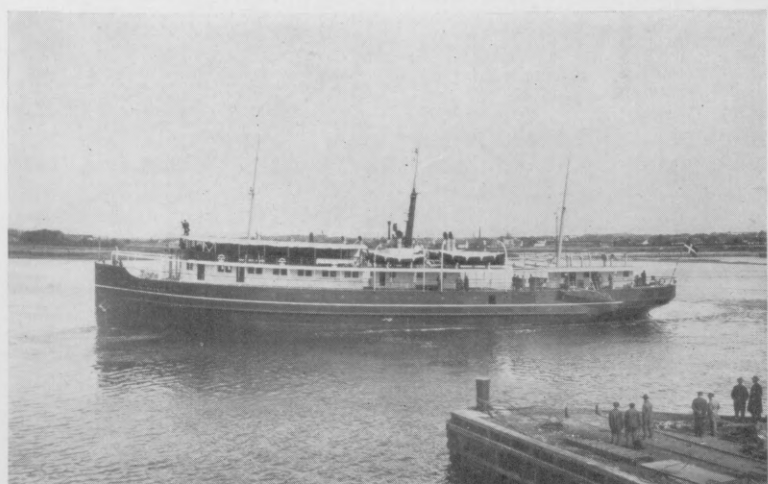
In the May issue, it was shown that the modern ocean freight ship is undergoing a metamorphosis in the course of being Dieselized. In the June issue it was indicated that passenger liners of the future, if of high power must be Diesel-electric. . . . In other words that there is a definite limit to the big double-acting Diesel. In this article, the author has delved into the possibility of Dieselizing a fascinating array of small fast passenger-carrying ships and passenger-cargo ships, and therein lies a potent message to domestic Diesel builders if they will take the trouble to study it carefully. America is the only big maritime country which doesn't possess Diesel coastwise ships, and she has the largest domestic merchant marine in the world.

valuable space where space is limited. One generator is sufficient for port use in conjunction with storage batteries—hitherto an unexplored field—for peak loads in port, while a generator driven off the main en-

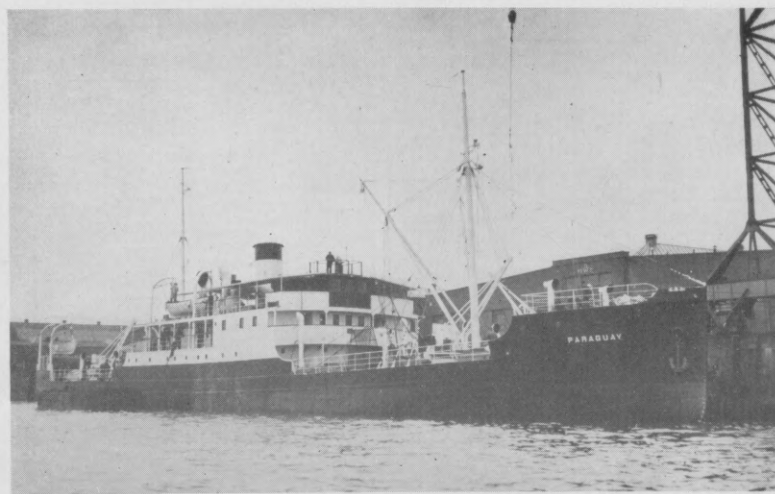
gine or engines will suffice for sea use. This will do much to give us more room for the main engines for that extra power perhaps which means the difference between 14 and 17 knots, in the small fast ships with which we are dealing. Examinations of the engine room layouts reproduced herewith show in one or two cases that space could be saved by eliminating two generators and placing one on one side.

Example A appears very much underpowered with only 4500 b. hp. for 428.8 ft. and 8500 tons gross, when even example B has 5000 i. hp. with 344 ft. length and 4372 tons gross. A is rather a lumbering old tub, although her main engines are of excellent well tried type.

And yet B is slower than D which has a maximum of 16 knots with 3100 hp. on supercharged 4-cycle machinery. Example D is interesting because she was the first fast motorship (or the first motorship of any kind, for that matter) employed in passenger work across the North Sea. Her route from Esbjerg, a packet port on the east Jutland Coast to Harwich, England, lies across some 340 miles of stormy North Sea and the normal schedule calls for a run of about 20 hrs. The run is about 55 miles longer than that between New York and Norfolk, Va. The design of the ship is conservative, because it is based upon existing steamers, because almost as much freight as passengers is carried, and because the American habit of side loading freight underneath the passenger decks.



EXAMPLE P
Siam Coast Passenger Packet Bhanurangsi, 900 hp.



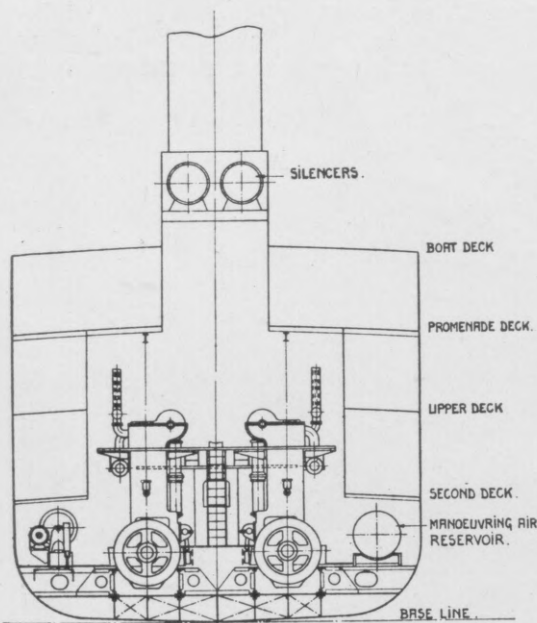
EXAMPLE R
Brazilian Coast Passenger and Freight Ship Paraguay, 1000 hp.

has never been adopted to any extent in European designs. . . . Future motorships for the same fleet, and it is unquestionable that the existing steamer fleet will gradually be replaced, will in all probability have a motorship-type arrangement. As has been pointed out previously, designers are only now beginning to evolve special hulls to suit the special requirements of the Diesel engine. This tendency is particularly noticeable in cargo ships.

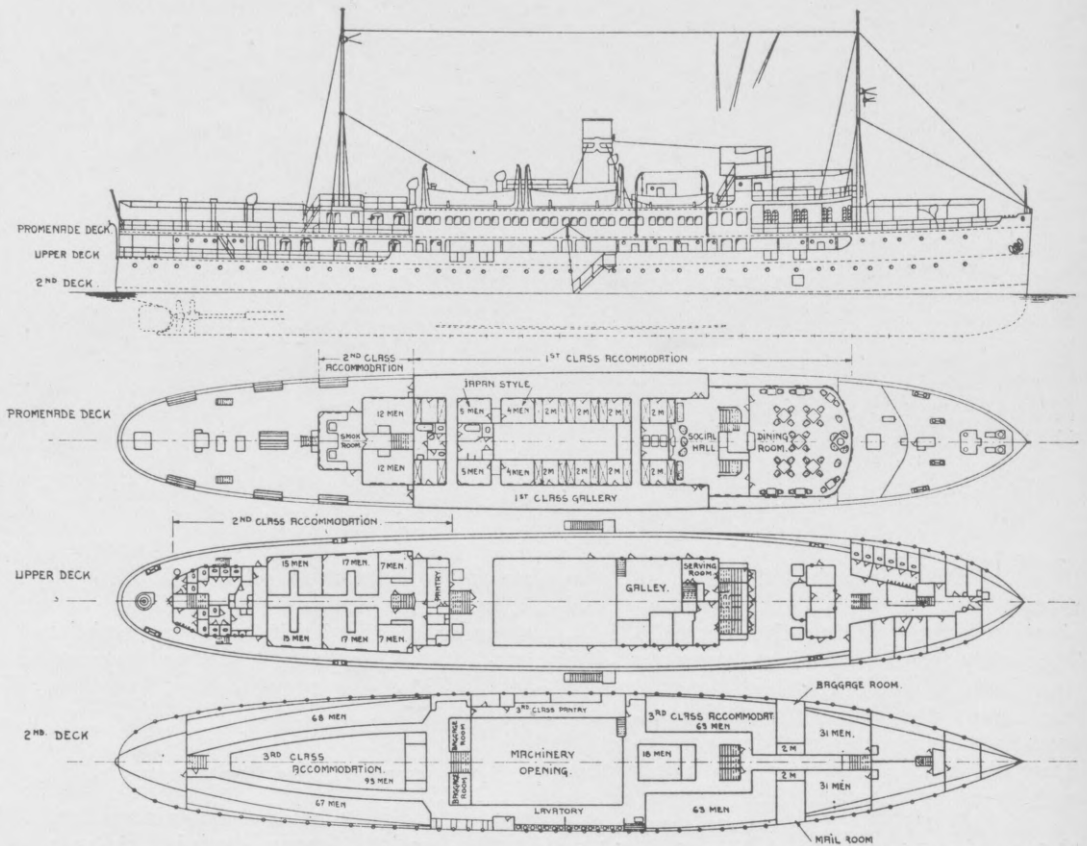
Of the examples we have under review here, the most evolute towards a new type are K and L both of which are actually fast passenger-only packets. Example K is a Japanese built ship, with Danish engines, specially built for the 240 mile Kobe-Bepu run on the Inland Sea of Japan, for which she has been given 1600 s. hp., her single-acting 4-cycle units of B. & W., 19.7 in. x 35.4 in. trunk piston type taking up in height a portion of three decks, i. e., practically the whole of the depth molded of the ship—19.5 ft. The same is true also of example L, which has two 10-cylinder M.A.N. 21.2 x 23.7, 4-cycle Diesels of crosshead type except that the upper deck machinery casing is not so large as the upper deck casing of example K. This gives a larger baggage and deck space in the case of the German ship. The engine space, with the auxiliary engine space, on the German ship is of course longer than on the Japanese ship and the saving in headroom is not so great as might be expected. It is definitely less, however, than the space which would be taken up by a triple expansion steam reciprocating engine and boilers.

The two ships under discussion, the PREUSSEN and KURENAI MARU, are particularly fine examples of good arrangement and are closely comparable with best practice in fast American Coastwise ships. Incidentally, their layout would permit of ready and efficient transformation into minelayers in case of naval necessity. The German ship has the sweeter lines and the well cut up stern with the absence of deadwood makes her a very handy ship. Both vessels have semi-balanced rudders but the Japanese ship has a full deadwood aft extending into a foot for the bottom rudder pintle.

Future fast coastwise ships can well



Diesels do not absorb more head room than steam engines. There is 1600 hp. in 19 ft. depth



General arrangement of Example K shows good practice in coastwise passenger ship design

follow these designs, and the American practice of sideloading cargo is particularly to be recommended. With regard to machinery weights it is difficult to say how these compare with steam units because of the lack of published information on both sides. It is fairly safe to say that the installations are not lighter than steam. Elimination of weight is the goal to which designers are always striving . . . alloy pistons are one noteworthy step in this direction. Then we have to consider also that there is no space absorbed by coal bunkers. Fuel can be easily carried in double bottoms, or, if these are not fitted owing to draft considerations, in tanks built into the ship round the ship's side in way of the engine rooms.

It does not seem that electric drive is desirable or advisable for the type of ship we have under consideration, chiefly for space reasons on the smaller fast ships. The auxiliary load is not high, being only 99 kw. in the case of example O which has 1160 i.h.p. for main propulsion. Note, however, that this "immense" load is split up between three generators. How much more simple to drive one generator off the main engine, use a storage battery set, and run one other set for port use. This little ship which runs between Copenhagen and Bornholm in the Baltic has a service speed of just over 13 knots. On trial, developing 1347 i.h.p. at an average of 146.5 r.p.m., a fuel consumption of 0.309 lb. of fuel per i.h.p. hr. for all purposes was registered.

Dimensions of Typical Coastwise and Short Sea Motor Passenger and Cargo Ships of 17 Knots and Under

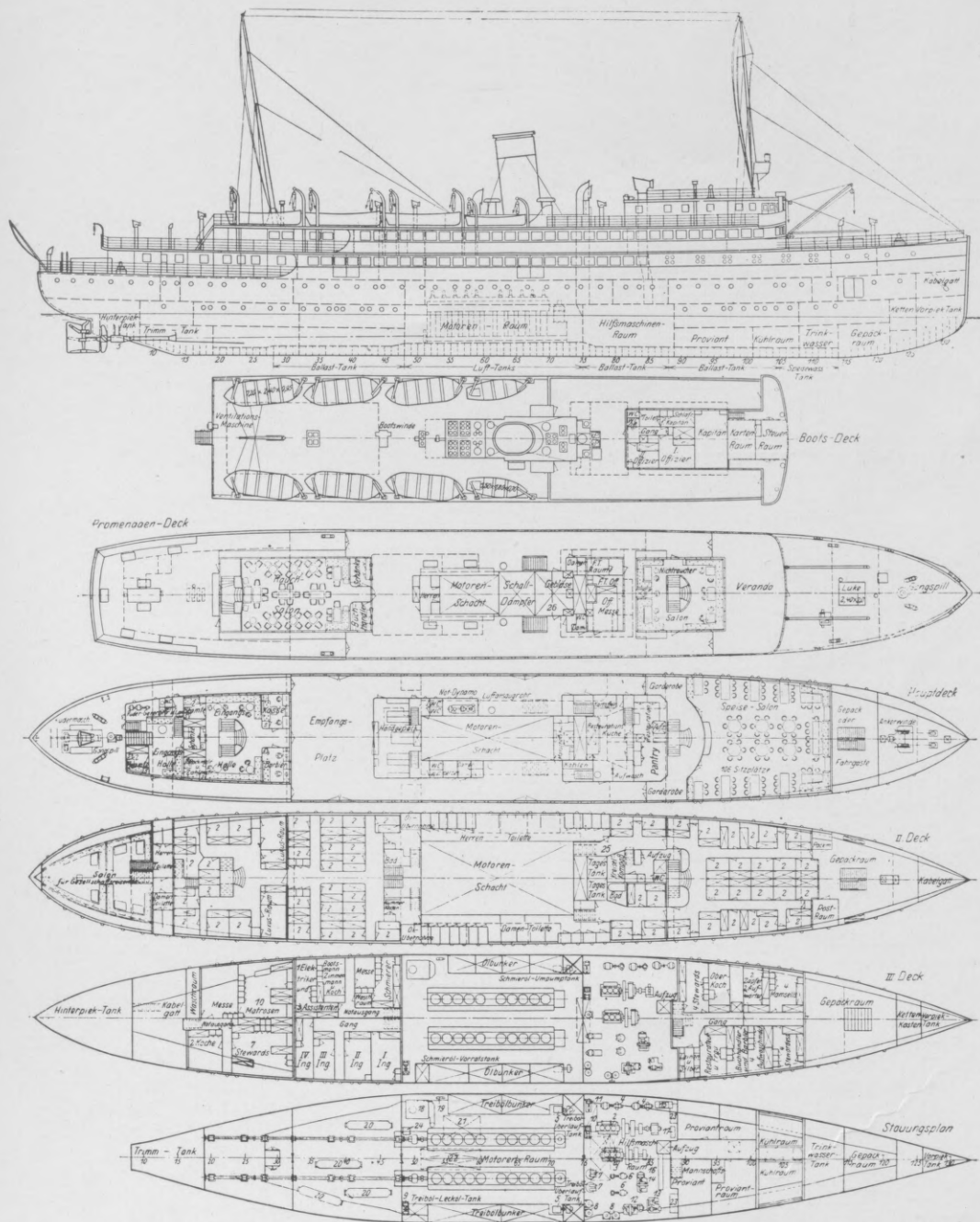
	NAME	SERVICE	REG. DIMS.			TONNAGE	No. OF PASS.
			L	B	D		
A	Theophile Gautier..	Mediterranean	428.8	56.0	34.5	8500 G	744
A1	Itapage	Brazilian Coast.....	370.0	52.0	26.7	3800 Dw	272
B	Koolinda	Australian Coast.....	344.0	50.0	28.6	4372 G	162
C		W. Indies.....	310.0	46.3	22.8	3200 G	32
D	Parkeston	North Sea.....	304.0	44.0	28.5	2762 G	—
E	City of Panama....	U. S. Coastwise.....	300.0	45.7	18.0	2614 G	—
F1	Brabant	Spanish Coasting.....	283.4	36.1	18.8	1554 G	101
F	Brabant	Oslo-Antwerp	—	41.0	22.5	2500 Dw	100
G	Dumra	African Coast.....	271.7	43.6	21.3	2304 G	44
H	Minnipa	Australian Coast.....	252.5	39.7	24.3	1600 G	—
K	Kurenai Maru ²	Inland Sea Japan.....	238.0	38.0	19.5	1541 G	148
L	Preussen	German Coast.....	262.5	38.1	22.5	2282 G	1403
M	Marudu ²	Spain Coast.....	263.2	41.7	17.8	1925 G	—
N	Malini ²	Spain Coast.....	223.0	35.5	18.2	1926 G	—
O	Frem	Baltic	210.5	35.0	13.7	1000 G	228
P	Bhanurangsi	Siam Coast.....	200.0	32.5	11.9	—	20
R	Uruguay	Brazil Coast & Amazon.	235.0	37.5	10.3	931 G	24

¹ Horn Line Ship. ² Ships so indicated have large "Steerage" capacities. ³ Converted steamer.

American Steam Coastwise Ships Listed for Comparison

1.....	Phila-Jacksonville	350.0	52.0	36.0	5486	325
2.....	New York-Charleston... ..	387.5	54.0	31.5	5300	369
3.....	Los Angeles-Avalon†... ..	285.0	52.0	21.0	2390 D	...†

† Height to top of engine casing 33 ft. 6 in. Width of engine casing 24 ft. Day steamer.



Courtesy Werft, Rederei, Hafen

Ms. Preussen, Example L, is one of the finest examples of the coastwise motor passenger ship yet constructed

Machinery of Typical Coastwise and Short Sea Motor Passenger and Cargo Ships of 17 Knots and Under

	NAME	POWER	SPEED	No. OF ENGS.	BORE	STROKE	R.P.M.	TYPE	No. OF CYLS.
A	Theophile Gautier	4500 B	—	2	23.6	41.7	110	2 cye. S. A.	6
A1	Itapage	3100 B	—	2	24.5	43.5	135	4 cye. S. A.	6
B	Koolinda	5100 I	15	2	25.0	43.0	125	4 cye. S. A.	8
C	—	2250 B	13	1	26.5	47.0	100	2 cye. S. A.	5
D	Parkeston	3100 S	16	2	21.6	35.4	195	4 cye. S. A.	6
E	City of Panama	2150 S	13	2	23.2	35.0	140	4 cye. S. A.	6
F	J. J. Sister	2800 B	15.5	2	21.0	21.0	200	4 cye. S. A.	10
F1	Brabant	2300 I	13.5	2	20.0	39.0	150	4 cye. S. A.	6
G	Dumra	1000 S	11	2	15.0	30.0	165	4 cye. S. A.	6
H	Minnipa	3000 I	14.7	1	—	—	—	4 cye. S. A.	6
K	Kurenai Maru	1600 S	14	2	19.7	35.4	150	4 cye. S. A.	6
L	Preussen	5000 B ¹	17	2	21.2	23.7	260	4 cye. S. A.	10
M	Marudu	1500 S	—	1	24.8	37.8	110	4 cye. S. A.	6
N	Malini	800 I	—	2	14.6	22.4	210	4 cye. S. A.	6
O	Frem	1150 I	13.3	1	19.7	35.4	130	4 cye. S. A.	6
P	Bhanurangsi	900 I	11	2	—	—	—	4 cye. S. A.	6
R	Uruguay	1000 B	12	2	—	—	—	4 cye. S. A.	—

¹ Supercharged—3500 hp. normal.

American Steam Coastwise Ships Listed for Comparison

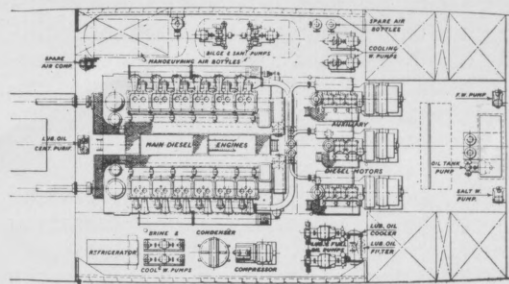
1.	2700 I	12	1	—	—	—	Steam Recip.	—
2.	4200 S	15	1	—	—	—	Steam Turb.	—
3.	3600 I	17	1	—	—	—	Steam Recip.	—

Furthermore in comparison with a steamer of exactly similar size, she has accommodation for 35 per cent more passengers and 15 per cent more cargo . . . That is one of the reasons why progressive coastwise and short sea shipowners are gradually coming around to recognize the potentialities of the motorship.

Note that in the case of example C, the auxiliary output is 180 kw. while in the case of example B it is as high as 330 kw. Each of these ships has four cargo holds with the necessary deck gear, used frequently because a number of way port calls are made. Example B, designed specially for the Australian Coast, has her forward winches mounted in a house top round the base of the foremast in conformity with best modern practice. Example C is designed for inter-island passenger and freight carrying in Caribbean Sea. Even in the case of example B it is doubtful whether electric propulsion would be necessary although these two ships are more suited than any of the others.

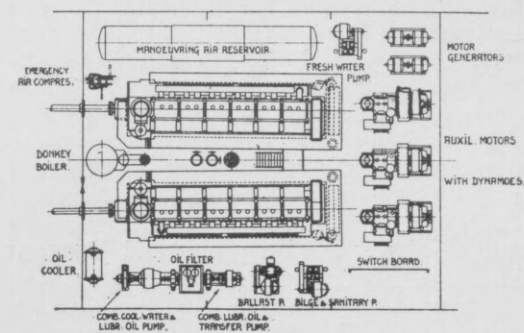
A twin screw multi-cylinder proposition seems generally good. It is interesting to speculate what effect a twin screw installation would have had upon example H where the engine room is well filled and all decks, even the strength deck, pierced by a big 6 cylinder 4-cycle Diesel driving a large diameter 4-blade propeller. This ship is also intended for Australian coastwise work and in many points in her design is similar to Ms. KOOLINDA, example B. She is, however, a shelter decker, and if we criticize her design in any way, it is on the grounds that she is an early example of her kind. Her engine is of well tried type and can be relied upon to function well under all conditions of operation.

Examples C, E, A1, F1, and G are representative of an increasing class of motorships in which cargo is as important a consideration almost as passengers. The Horn



3100 hp. is condensed into this compact layout

Line of Flensburg uses example C, a unit of quite a numerous motorship fleet, for inter-island work in the West Indies. Example E, the well-known CITY OF PANAMA, which with ms. CITY OF SAN FRANCISCO,



1600 hp. is arranged in this engine space

is at the time of writing the only coastwise motorship operating on regular schedule from an American port, is a similar ship. She operates in the San Francisco-Panama Canal service of the Panama Mail—one of the Grace Lines group—and calls at no less than 12 way ports en route including Los Angeles, as the attached map indicates. This schedule of the Panama mail is designed to give the most effective service to coffee shipments to San Francisco and to Panama, in the case of the latter for shipment to Europe. Thus when outward bound, she can take a U. S. general cargo (about 3000 tons) at San Francisco and Los Angeles for Central American ports discharging there, and picking up coffee and tropical produce for Panama for transshipment. On the return, transshipped cargo for Central American way ports via the Canal is taken and coffee loaded for San Francisco. San Pedro, of course, is an excellent bunkering port.

The ships were built and engined in Sweden and are of good conservative "three-island" design with the passenger accommodations arranged amidships. Actually the layout is very little different from what might be expected with a similar steamer, but it is doubtful whether it could be improved upon for the work which has to be done. It is to be noted that the modern method of mounting the winches in winch houses clear of the deck has not been adopted.

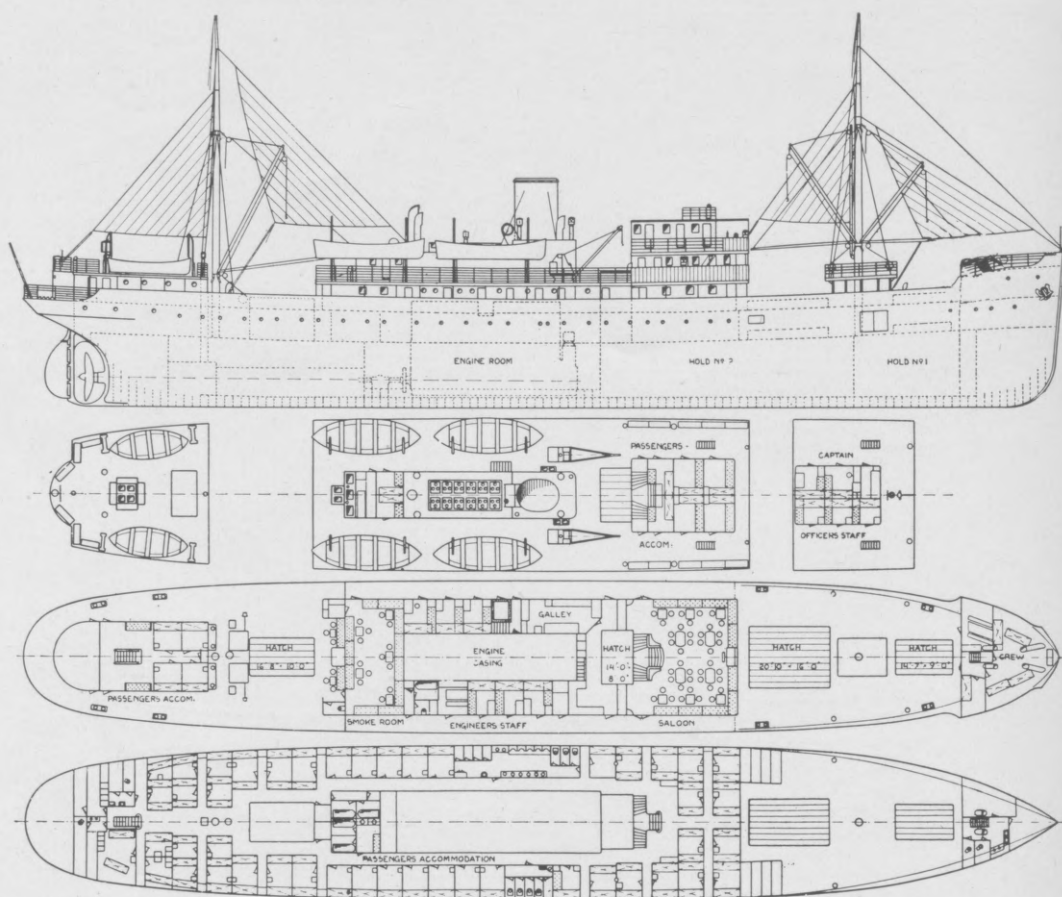
Example G is a smart little passenger and freight packet designed for picking up cargoes and passengers at the way ports on African East Coast for transportation to the main ports, there to await transshipment to large ocean-going ships. The same function is fulfilled by examples M, N, and P on the Siamese Coast, while example R operates from Rio de Janeiro making calls at way ports in the Brazilian Coast and also up the Amazon.

Large continents with miles of coastline sometimes possessing poor railroad facilities, and in other cases no railroad facilities at all need fast economical water transportation for freight and passenger collection for transshipment and for the distribution of necessities...this need the motorship is now filling.

Packet ports need rapid, comfortable, and economical transportation of passengers and their baggage. On certain coastlines the fast coastwise ship can compete easily with the railroad...this need the motorship is now filling in all but the highest powers. The shipbuilder and the naval architect are waiting for the engine designer to help them out in this direction.

The foregoing has shown something of what has been accomplished in the past. The series of examples specially selected and analyzed shows where we are at present and the lines upon which development is likely to take place. The small passenger, or passenger-cargo motorship, is one of the most fascinating problems for the designer of ships and ingenuity demanding questions for the layout man. The keynote to a successful ship is "Forget Steamer Practice." The two most modern examples quoted above, the PREUSSEN and KURENAI MARU are complete departures from the steamer idea.

Lack of a thorough study of the relationship of the Diesel engine to the ship



General arrangement of a Danish built 14 knot passenger and cargo ship for the Australian Coast (Example H)

Routes of Typical Coastwise and Short Sea Motor Passenger and Cargo Ships

SPEED	NAME	TERMINAL PORTS	NAUTICAL MILES	
A —	Theophile Gautier.....	Marseilles	—	Via way ports
E 13	City of Panama.....	S' Frisco-Panama	3249	Via way ports
D 16	Parkeston	Esbjerg-Harwich	340	direct
G 11	Dumra	Zanzibar	—	Via way ports
K 14	Kurenhai Maru.....	Kobe-Beppu	240	direct
L 17	Preussen	Swinemunde-Phillau	255	direct
M —	Marudu	Singapore-Bangkok	840	Via way ports
N —	Malini	Singapore-Bangkok	840	Via way ports
O 13.3	Frem	Copenhagen-Bornholm	—	direct

hull in all its special phases unquestionably has become a big factor in retarding more extensive application to American coastwise shipping. Investigation reveals that in nearly all cases where American ship-owners have considered the oil engine side by side with steam machinery, and rejected it on account of high first cost, weight, and space, the reason has been that only one hull had been designed for both types of power, and stereotyped steam power was compared with Diesel power represented by the big heavy slow speed, crosshead type of Diesel designed for ocean cargo vessels.

When the regular schedule of a ship does not call for more than a few days non-stop run between ports, trunk-piston Diesel engines of medium weight, moderate overall dimensions, and reasonably high speed, say 175 to 220 r.p.m.—can be used with every reliability. There is no necessity, in such cases, for slow, heavy crosshead engines, although if the owners insist on crosshead units, Diesels of this speed can be built at somewhat higher cost. For instance, the crosshead type engine in the American coastwise motor-tanker PINTHIS runs successfully at 185 r.p.m. Eminent

propeller designers have asserted that there is no difficulty in the way of producing efficient propellers at 200 r.p.m. and even up to 250 r.p.m.

Burmeister and Wain have been most progressive in the development of and advocacy of the high speed, trunk-piston oil engine during recent years for coastwise vessels, even though many of the ocean-going motorships they have engined since 1914 have had slow-speed crossheads engines fitted.

In the 315 ft. Danish train-ferry KORSÖR, operating a 24-hour service of twelve 1½ hr. trips, there are two direct connected 8-cylinder trunk-piston Diesels aggregating 4000 i.hp. at 200 r.p.m. That the propeller efficiency is good is indicated by her loaded speed of 15½ knots. She is quoted merely to draw attention to her high engine speed.

The new small fruit-carrier GUNDERSEN chartered by the United Fruit Co., makes 14 knots with two six-cylinder Diesels aggregating 2600 i.hp. at 170 r.p.m. Again, in two large passenger vessels running between England and Denmark, trunk-piston Diesels aggregate 4000 hp. at 200 r.p.m.

(Continued opposite)

Three Fast Motorliners for San Francisco

Details of the New Nippon Yusen Kaisha Passenger Motorliners Which Will Operate in San Francisco-Far Eastern Services

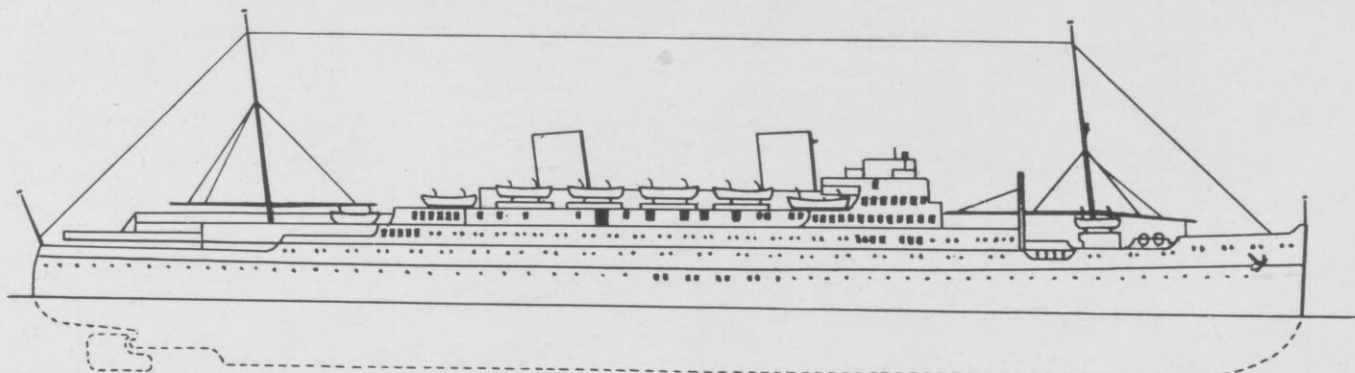
NIPPON YUSEN KAISHA, who will shortly operate out of San Francisco the finest and largest passenger motorliners in transpacific service recently declared a dividend of 8 per cent for the six month period ended March 31. The company's net earnings were 2,780,000 yen, which sum was slightly in excess of the previous 6 months.

knots, which can be increased to 21 knots, whenever necessary.

AORANGI, first transpacific motorliner was propelled by four single-acting Sulzer Diesels and curiously enough two of the N. Y. K. vessels, which are to be built at Nagasaki, will be equipped with four single-acting Sulzer Diesels, which will develop 20,000 hp., while the third liner,

instead of berths, and each room will have hot and cold running water. There will be a number of suites consisting of two, three and four rooms on each of the vessels. Many of the rooms are equipped with bath.

In order to eliminate vibration, special attention has been paid to the construction of the hulls. The ships will be equipped



Diagrammatic outline sketch showing appearance of the big motorliners now building in Japanese shipyards for N. Y. K. transpacific service

T. Shirani, president of the N. Y. K., who presided over the semi-annual general meeting of the shareholders stated that the line now has under construction three large motorships for the transpacific service and two smaller vessels for the Japan-China express trade. To cover the cost of the new ships the company issued on May 2 of this year debentures amounting to 15,000,000 yen.

Each of the new transpacific motorliners will measure 560 ft. in length and will have a beam of 73 ft. They will be of 16,500 gross register tons and 20,000 tons displacement, with an average speed of 19

which is to be built at Kawasaki, will be equipped with two sets of B. & D. double-acting Diesel engines, which will also develop 20,000 horsepower.

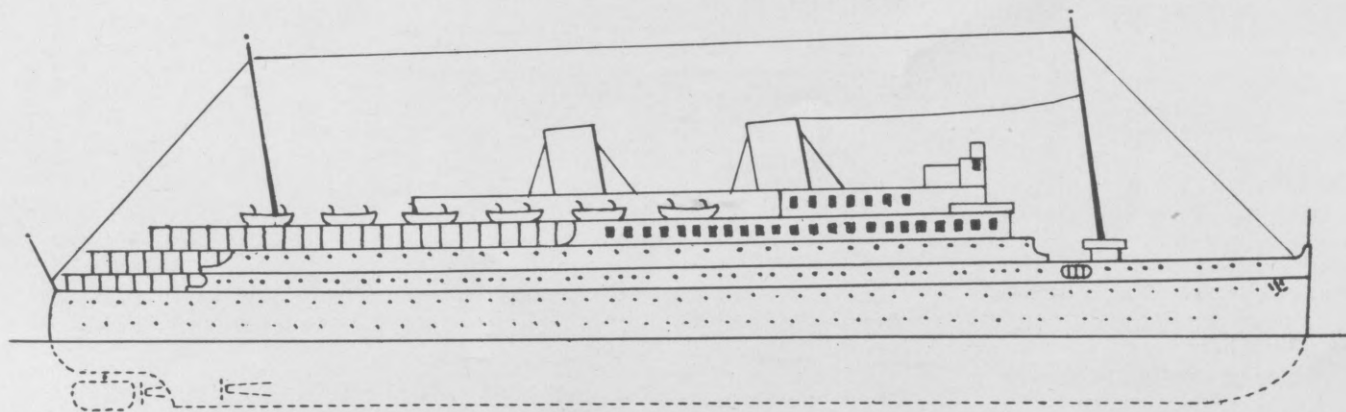
It is expected that the first vessel of this building program will enter the service from San Francisco to Japan and the Far East in the latter part of 1928.

The three vessels will be equipped with all modern devices. The passenger section of the ships will receive special attention and will have many features, such as swimming pool, motion-picture theatre, tennis courts, squash courts, deck golf, etc.

The cabins will be equipped with beds

with anti-rolling devices. The company is expected to announce shortly the names of the three vessels.

As the profile view shows the new ships will be distinctive in appearance and typically motorships in appearance. The fat oval stack first adopted on the R.M.S.P. Co's. ms ASTURIAS seems to have been used in this case also. This advent on transpacific trade routes will be eagerly awaited, and people are already beginning to wonder what move the Canadian Pacific Co. will make to make its existing fleet capable of operating in opposition to fast modern economical motorships.



Rough outline sketch of the new Furness-Bermuda motorliner (based on artist's drawing) makes interesting companion with above. Her length is 550 ft., beam 74 ft., and gross tonnage 20,000

Motorshipping Marks New Era in Sea Transportation Business

(Continued from opposite)

The latter two vessels are not coasters, but the speed and type of oil engines installed can well be adapted for coastwise vessels. Compared with the steam engine, these engines will mean smaller engine rooms, less machinery weight, less fuel ca-

capacity and weight and reduced fresh water weight, while the advantages thereby accrued will offset the interest in any higher first cost, leaving the big saving in fuel consumption as a profitable gain.

We have heard it repeated time after time by shipping men, without substantiation of facts, that motorships are only economical on long runs. This is hard to understand seeing that during the time

spent in port, the motor-vessel's fuel costs are less than one-tenth of that of a steamer, and one-quarter at sea.

The solution of the coastwise motorship problem rests largely with the adoption of higher speed oil engines in conjunction with supercharging. Engine builders—with shipowners and naval architects' co-operation—can with advantage turn more attention to their development.

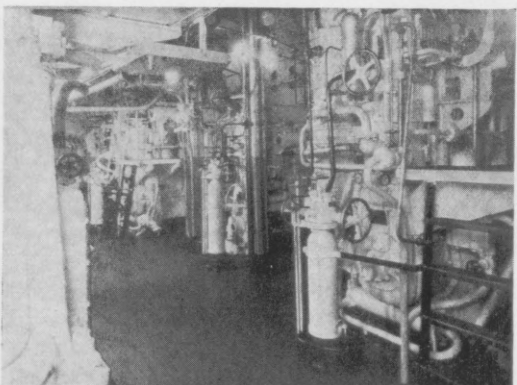
A 3400 Hp. Diesel-Powered 3-Track Railroad Ferry



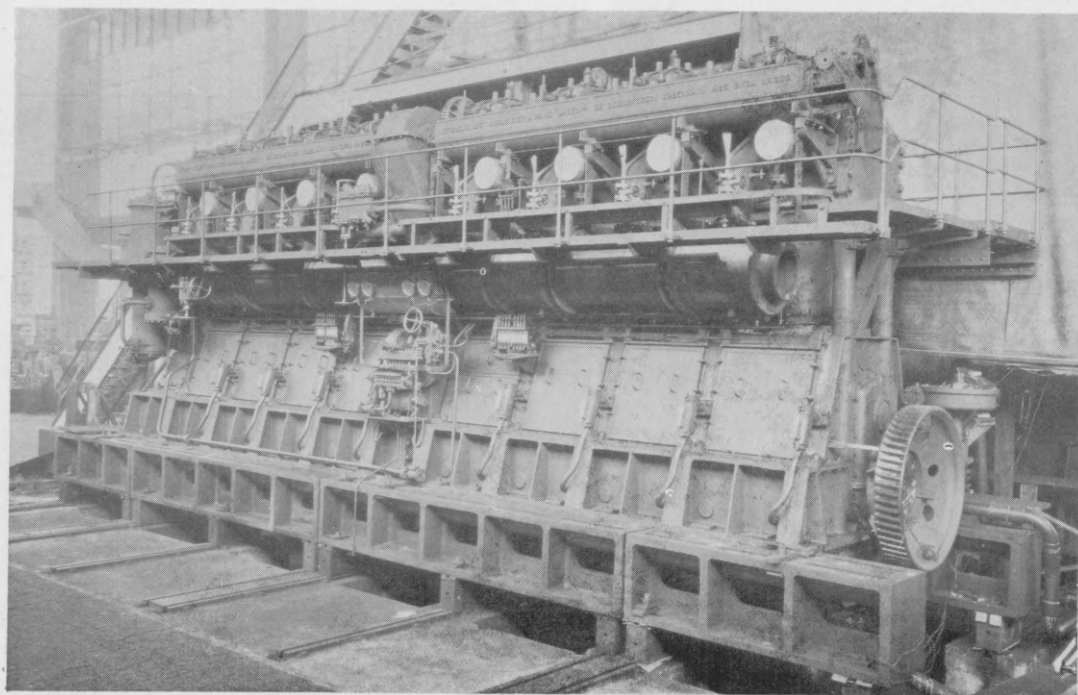
Twin stacks on boat deck



Hull construction in engine room



Auxiliary generator sets



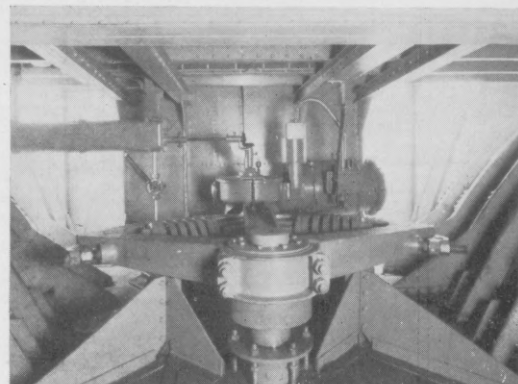
One of the two 8-cylinder 1700 hp. 4-cycle trunk piston Diesels for main propulsion

THE fact that Diesel engines permit of a larger number of rail cars to be loaded on deck, in addition to eliminating all standby losses with this type of prime mover, has been instrumental in the construction of a large motor ferryboat for operation in Denmark. This shows that the economies of the Diesel engines are being realized in many fresh branches of shipping.

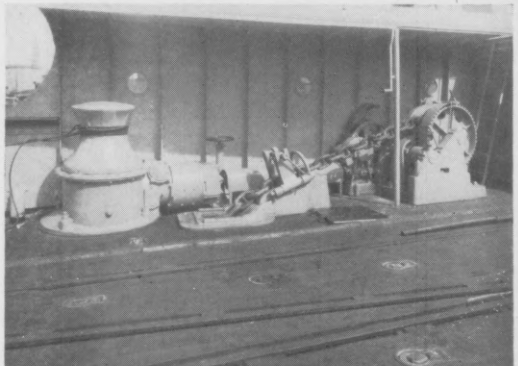
Denmark, ever a Diesel enthusiast and first country to run an ocean-going motorship, has now commenced to apply the Diesel prime mover to the ferry boats which connect one side of that water-divided country with the other. The route from Esbjerg on the Jutland coast to Copenhagen, the capital, is broken up by two stretches of water, the Little Belt and the Great Belt, across both of which railroad cars are carried in double-ended ferryboats, which in characteristics are a cross between the double-ended harbor ferryboats and the railroad transfer ferries used in San Francisco Bay.

Hitherto all these vessels in Denmark have been steam driven but Diesel engines have been fitted in a 15½ knot vessel constructed at Elsinore Shipyard, Denmark, for service across the Great Belt on the main trunk route between Copenhagen and Esbjerg. This passage between two terminals, Korser and Nyborg, takes about one hour and ships employed on the route are worked very hard, making ten to twelve passages daily. The fitting of Diesels has permitted three rail tracks to be laid and has dispensed with the large casings and uptakes associated with the steam ferry. The vessel is 310 ft. long with a maximum beam of 58 ft., a load draft of 12 ft. 6 in. and a displacement of 3120 tons. Two Burmeister & Wain trunk piston engines developing 1700 i.hp. each give the ship a normal loaded speed of 15½ knots. Restaurants and accommodation for passengers are fitted.

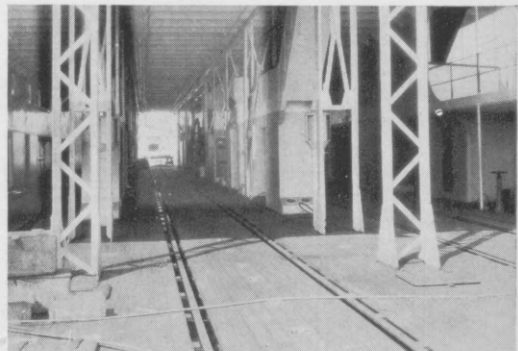
Great economy of operation is reported.



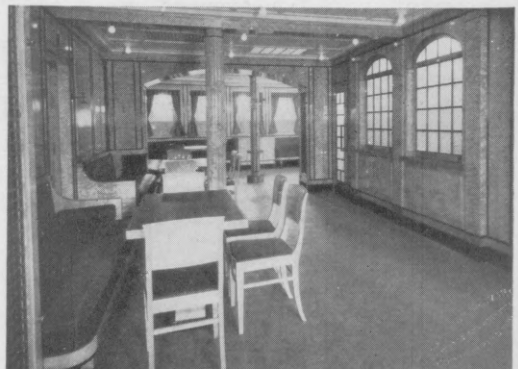
Bow rudder control



Compact capstan gear



Center track on main deck

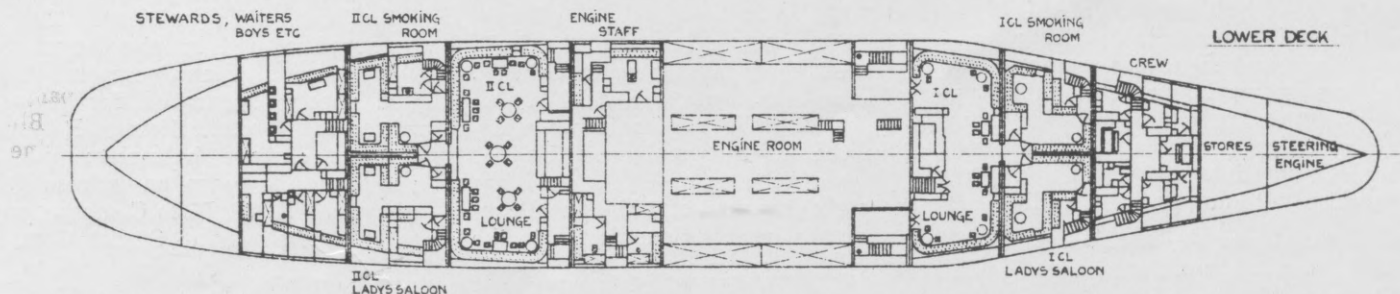
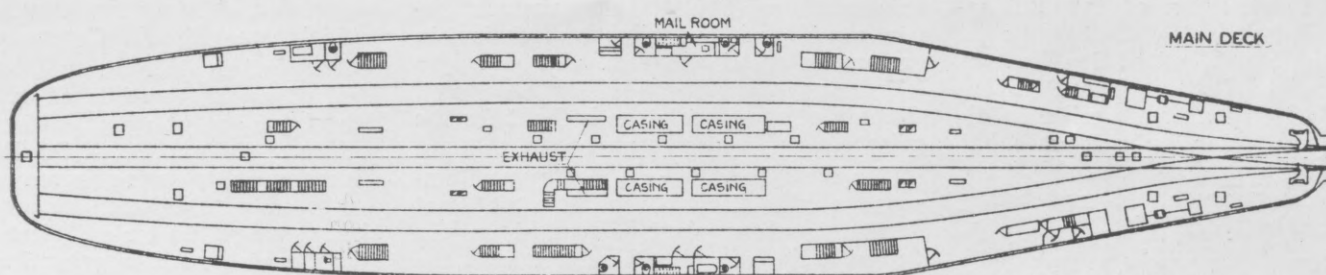
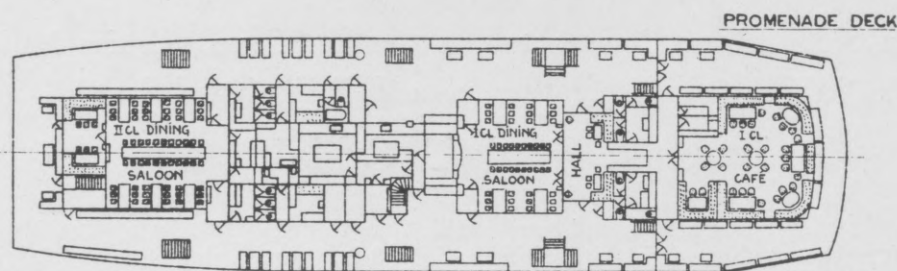
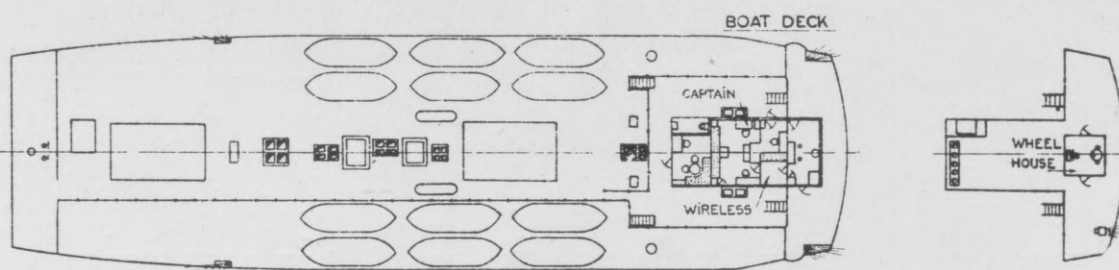
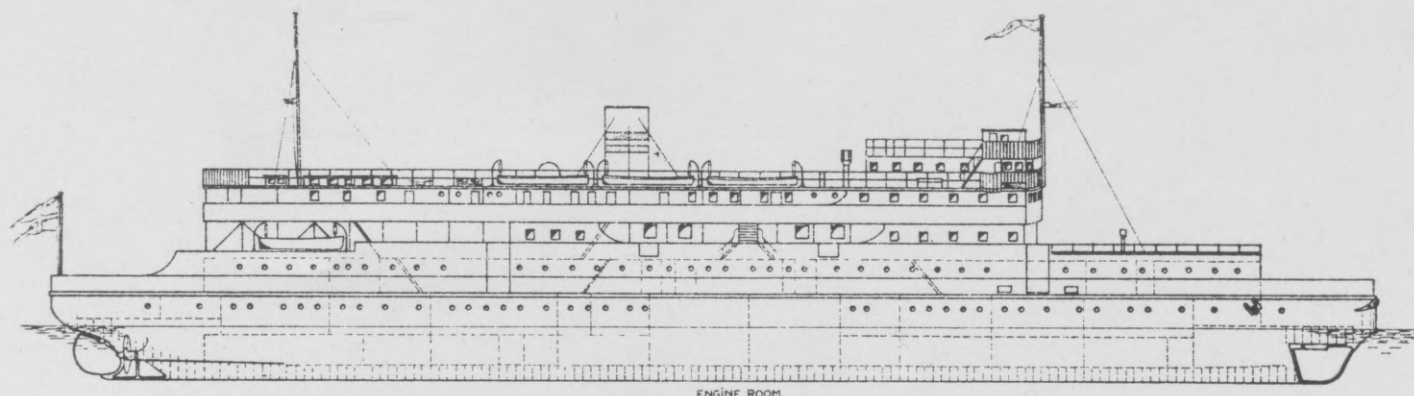


Excellent accommodation is fitted

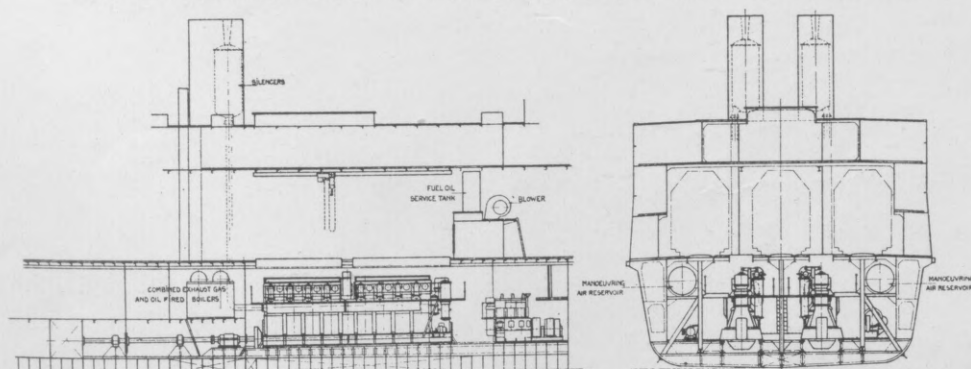


First class cafe on promenade deck

A 3400 Hp. Diesel-powered 3-track Railroad Ferry



Hull arrangement of the Danish car ferry Korsør makes interesting comparison with the steam driven railroad Ferries on the Great Lakes. She has 9 ft. less depth molded and 600 hp. more than a corresponding Great Lakes steam vessel



Notice the compact machinery arrangement. Two 1700 hp. 8-cylinder 4-cycle Diesels give the ship a 15-knot speed with big fuel economy



Danish and Great Lakes Railroad Ferries Compared

	DANISH	LAKES
Length	310	360
Beam	58	56
Depth	12.5	21.5
Power	3400	2800



Peruvian Submarines and Submarine Base

Two 600-ton Submarines, Constructed at Groton, Conn., Cruise 10,000 Miles in 6 Months, Operating from Well Equipped Base

By Capt. Frank T. Cable*

THE Electric Boat Company, Groton, Conn., completed recently for the Peruvian Government a contract embracing the construction of two Submarines, R-1 and R-2, and the building of a Naval Base on the Island of San Lorenzo in the Harbor of Callao. The Peruvian Government selected a boat similar in dimensions to the United States R Class, but in which have been incorporated all the changes and improvements suggested during and since the World War.

This type of boat, about 190 ft. long, 600 tons surface displacement, with a tank capacity equal to nearly 20 per cent of this displacement, provides comfortable living quarters for officers and men, and assures operation in any seaway. In fact, this type of boat is very much drier in a rough sea than many of larger displacement.

With a surface speed of 14½ knots, a submerged speed of 10 knots, a large radi-

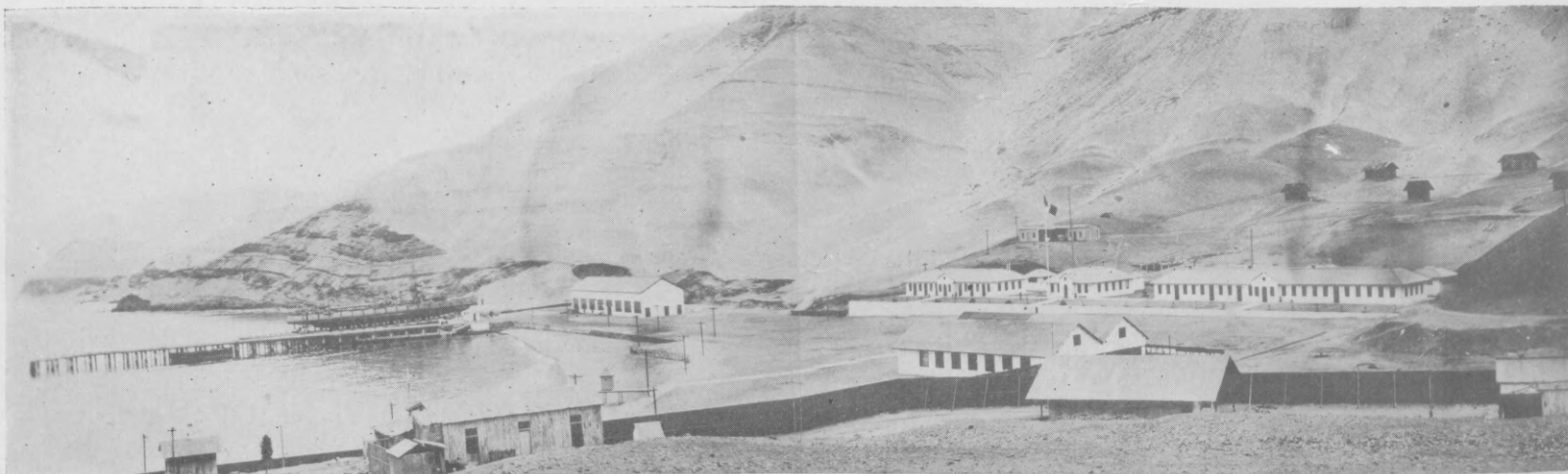
us of action, and armed with four torpedo tubes, eight torpedoes and a 3-in. gun, these boats are equal or superior to many submarines of 800-900 tons surface displacement, and but slightly inferior in armament, speed and radius of action to still larger submarines. Note, however, that six of these boats can be built for the price of one large submarine.

The New London Ship & Engine Company, a subsidiary of the Electric Boat Company, whose plant is located on the Groton side of the Thames River, the mouth of which forms the harbor of New London, Conn., constructed not only the engines for these boats, but also the hulls and most of their auxiliary machinery. The keels for both boats were laid late in February, 1925, and the boats were delivered in the Summer and early Fall of 1926.

In the early Summer of 1925, the Peruvian Government sent a Commission to the

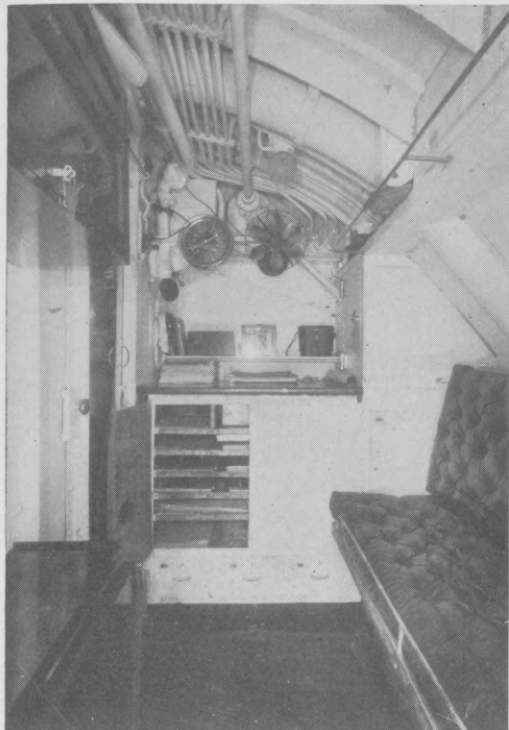
Works of The New London Ship and Engine Company, consisting of the future officers of the boats, an Inspector of Machinery, and a chief of the Commission, who later became Flotilla Commander.

Soon after their arrival, the Electric Boat Company established a Submarine School for the officers; and under the direction of the experts of the Electric Boat Company, they were given a training course in submarines, submarine navigation, storage batteries, electric motors, Diesel engines; and in great detail a course in design, arrangement, operation and care of the boats then building. This course was supplemented by short courses given by the various manufacturers who furnished special apparatus for these boats, such as the Electric Storage Battery Company on storage batteries; the Sperry Gyroscope Company on gyroscopic compasses; the E. W. Bliss Company on torpedoes; the Submarine Signal Company on



Complete submarine base constructed in Callao Harbor for the Peruvian Government by the Electric Boat Co., Groton, Conn.

* General Manager New London Ship & Engine Co.



Submarine RI—officers' quarters

submarine signalling, listening devices and fathometers; the Electro Dynamic Company on electric motors; and General Motors on Frigidaire. By the courtesy of the Navy Department, the officers also received instruction at the local U. S. Submarine Base.

The Peruvian crews arrived at the plant several months before the boats were delivered. A school was immediately started for them, in which the men received instructions from their own officers. As a result of this preparatory work, soon after the boats were operating, the men were found capable of taking over the control, and within a very short time were operating the boats with 100 per cent Peruvian personnel.

The R-1, second boat to be launched and delivered, was turned over on October 4th, 1926. After delivery, both boats made frequent trips out of New London, and also made several short cruises for the purpose of training the crews. When finally the officers were satisfied that their crews were well trained, both boats sailed, on November 20th, 1926, from New London for Peru.

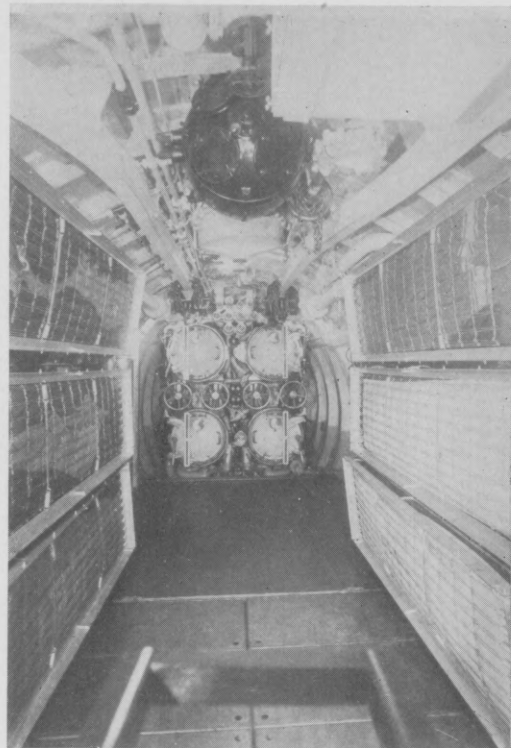
With full confidence in their boats, engines and crews, the course was set due south for the Windward Passage just east of Cuba—from here the course was more to the westward, as no stop was to be made until the boats reached the entrance to the Panama Canal at Colon. This port was reached early on November 28th, 1926—a run of 2050 miles without a stop or a delay of any kind: certainly a remarkable trip for two new boats, each manned by a newly trained crew.

In order to schedule their arrival in Callao on the day set for their official welcome, the boats did not leave the Canal Zone until December 6th. The run down the West Coast of South America was made without incident, and no stop was made until they reached the harbor of Ancon, 20 miles north of Callao, where a stop was made just long enough to clean up and prepare for an official welcome.

On the morning of December 12th they arrived outside the harbor of Callao where they submerged and ran in among the welcoming fleet, making porpoise dives, until they finally blew tanks and came to the surface abreast of the flagship where President Leguia was awaiting them to offer his welcome after their 3,800 mile trip.

Twenty days after their arrival, the submarines were ordered to join the fleet for its annual Summer cruise, which is taken each year for the instruction of the midshipmen attached to the Naval Academy. This cruise lasted for a period of three months, during which time the fleet covered approximately 6,000 miles. The cruise extended as far north as Punta Arenas, Costa Rica, and as far south as Pisco, Peru. During the whole 10,000 miles covered by these boats from the time they left New London, Connecticut, until they finished the cruise at Callao, Peru on March 18th, 1927, the engines were never stopped except by orders of the flagship, or when port was reached. The perfect performance of these boats during the trip south, and during their Summer cruise has again demonstrated the reliability of Nelseco Diesel engines and American-built submarines.

The main engines are of the standard submarine type as developed by the New London Ship & Engine Company. They have 6 cylinders 13½-in. bore x 14-in. stroke and develop 440 hp. at 400 r.p.m.



Crew's space and torpedo tubes

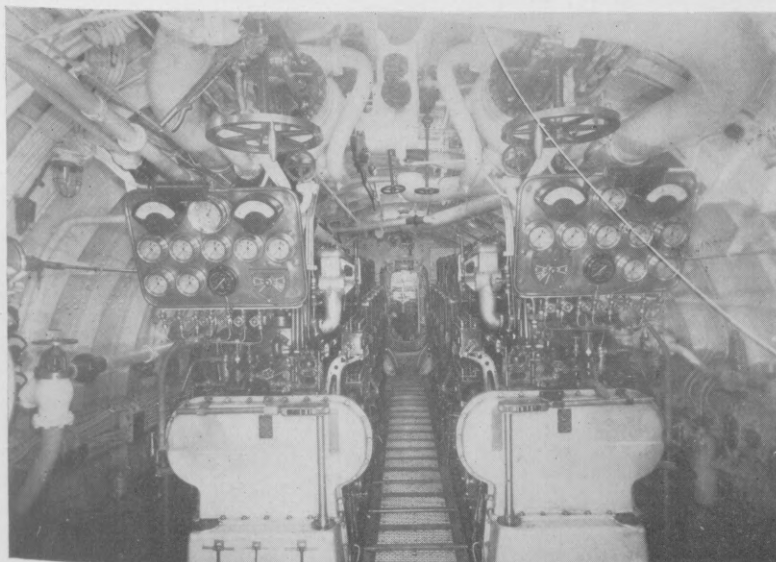
They are of 4-cycle single acting, four cycle type, direct connected to the propeller shaft through the armatures of the main motors.

The main motors, also directly connected to the propeller shaft, are of the standard submarine type as developed and built by the Electro Dynamic Company of Bayonne, N. J., a subsidiary of the Electric Boat Company, as are also all of the auxiliary motors.

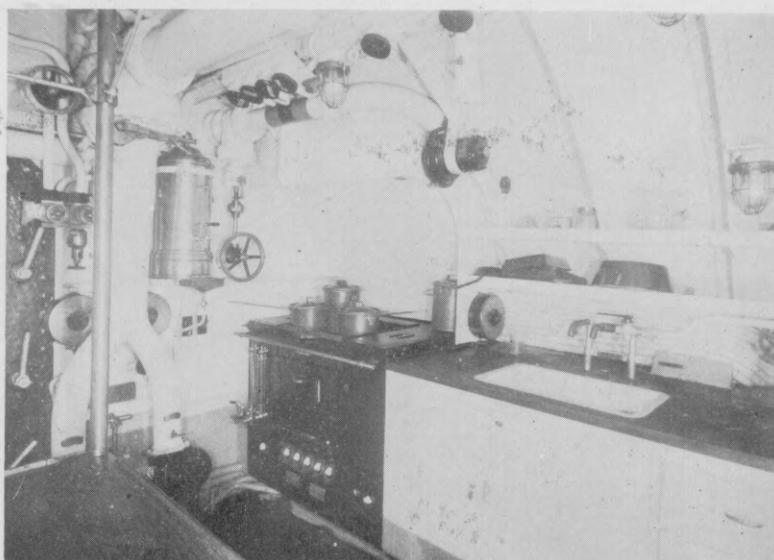
The complete success of R-1 and R-2 led to a repeat order for two sister ships, R-3 and R-4, which are now under construction at the New London Ship & Engine plant at Groton. The keels of these boats, which are scheduled for delivery in 1928, were laid last March, and work on the hulls and machinery is progressing rapidly in all departments of the plant.

Submarine Base

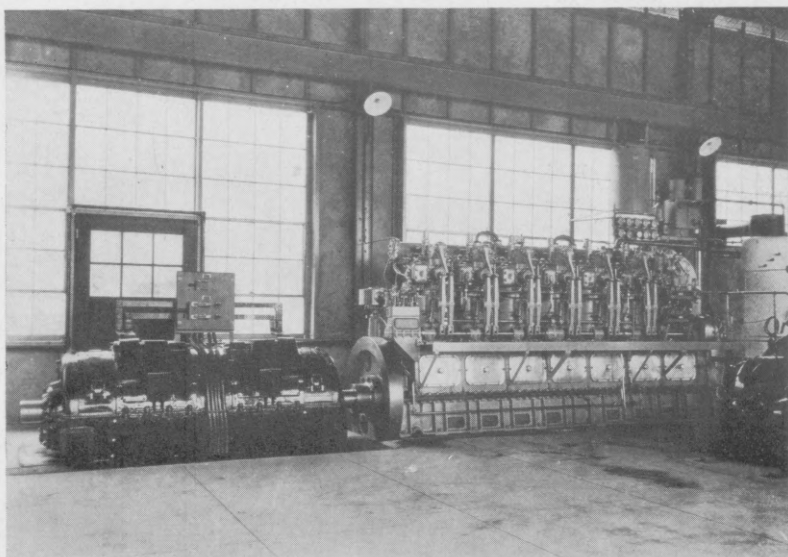
The Submarine Base is located on the Island of San Lorenzo, which forms the western boundary of the harbor of Callao, the principal seaport of Peru. It was designed by the Electric Boat Company so as to afford an adequate operating and repair



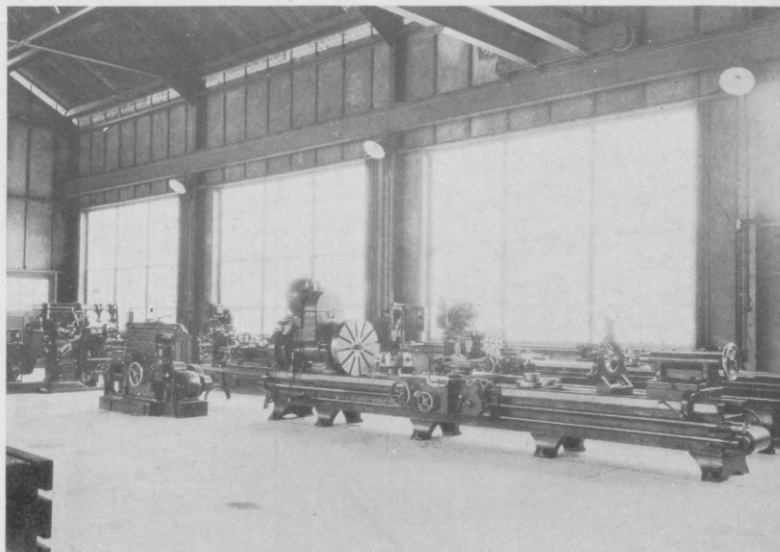
Two main Nelseco propulsion units



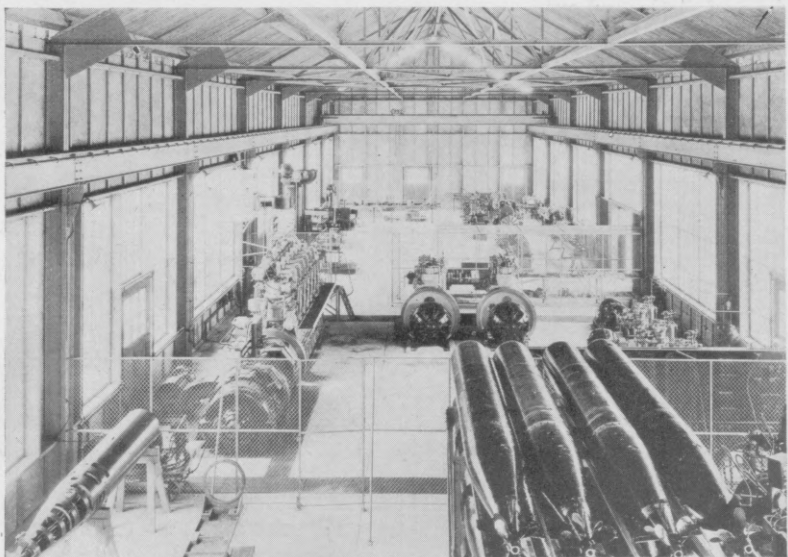
The galley, fitted with electric ranges



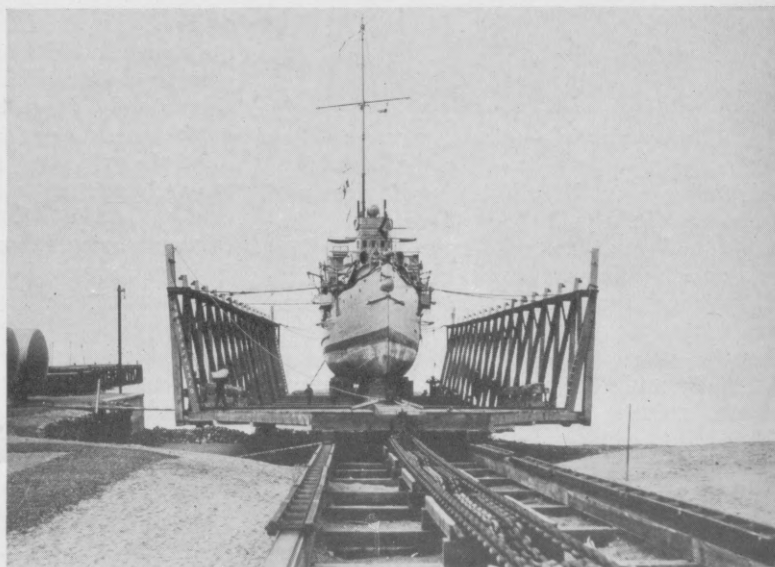
A 300 kw. Diesel generating set in the base



Callao base machine shop showing the big N. B. P. lathe



Torpedo repair shop at Callao base



Small destroyer on marine railway at base

base for the Peruvian submarine flotilla, and was especially laid out so as to permit of logical enlargement to meet future demands. The marine railway, the submarine berths and certain other structures were designed and constructed by the Crandall Engineering Company of Boston under a sub-contract. The remainder of the work was executed directly by the Electric Boat Company.

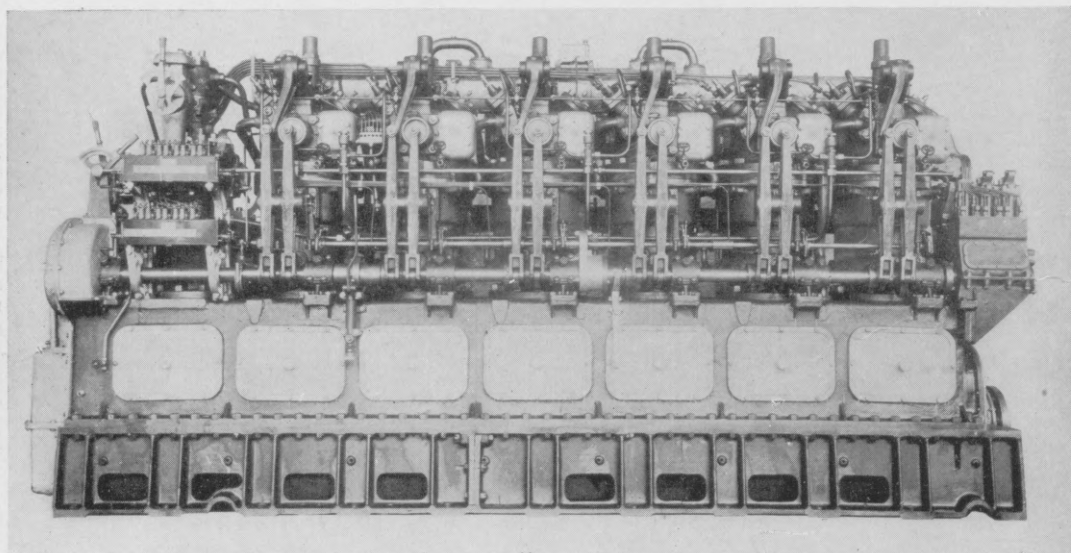
The northern end of the site is devoted to the administration building, officers' so-

cial hall and quarters for officers and crews, all conveniently grouped on a terrace supported by a substantial concrete wall; while the southern end of the site has been devoted to the industrial part of the establishment, comprising a marine railway of 1500 tons capacity, two wet slips for submarines 300 feet long, storage and handling facilities for fuel oil, lubricating oil and fresh water, and an industrial building housing a power plant, machine shop, electrical shop and torpedo

and periscope shop. The main engine in the power house is of the same type as those installed in the submarines, i. e., Nelseco 4-cycle, 440 hp. at 400 r.p.m. type. It is directly connected to a 300 kw. double armature generator of sufficient capacity for operating the marine railway and charging the storage batteries of submarines. The plant also includes two 55 hp. auxiliary engines of the Nelseco, mechanical injection type directly connected to 45 kw. Electro-Dynamic generators. Each of these sets is adequate to carry the normal power and lighting load when the marine railway is not in operation, nor submarines being serviced. The power house is also equipped with three electrically driven, high pressure air compressors, an individual storage battery cell motor generator booster set, and an oil fired evaporator.

The submarine berths are connected to the industrial building by a narrow gage railroad track and by the piping and wiring necessary for servicing the boats when desired with fuel oil, lubricating oil, fresh water, high pressure air and electric current.

Both in design and construction, the structures, buildings, machinery and equipment of the Base adequately represent the best and most modern American practice, and it has served well to promote and the favorable position enjoyed by American industry in Peru.



A 6-cylinder Nelseco submarine engine rated at 440 hp. at 400 r.p.m.

Southern Pacific Ferries' Machinery

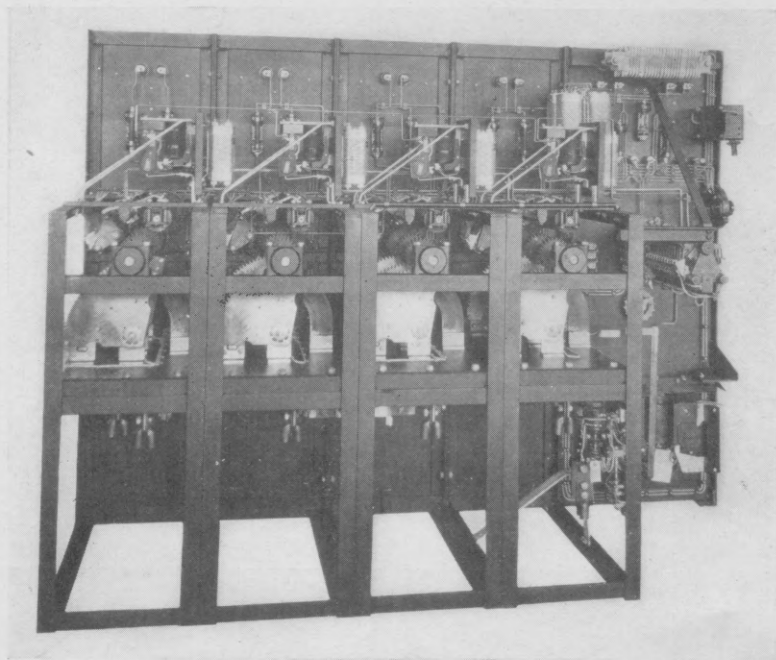
Diesel-Electric Propulsion Gives High Operating Efficiency and Fully Justifies Owners' Choice for Their New Fleet

THE recent trials followed by the placing in service of the new Southern Pacific ferryboat FRESNO, emphasize the advantages of Diesel-electric drive for this type of vessel. The high efficiency of the Diesel engine as a prime mover, and the marked success of electric drive on other ferries in San Francisco Bay, led the

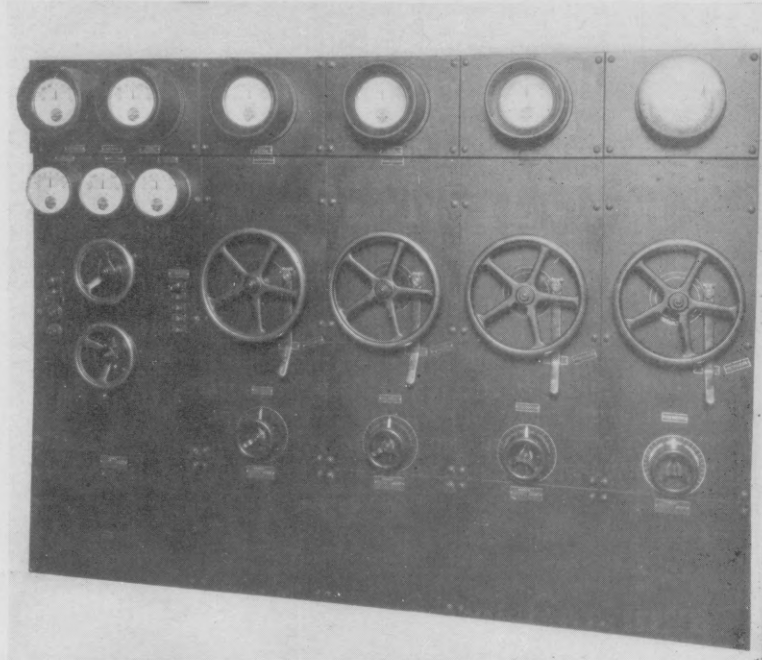
the motors may be located at convenient places in the ship, thus allowing considerable freedom in the design of the vessel.

As in stationary power plants, the Nelseco engines, specially selected for these ships, run continuously for long periods in one direction of rotation, thus obviating the necessity for banks of starting air bot-

On the Southern Pacific boats, which are double-ended, a separate double-armature motor is provided for each propeller. Each motor is rated 1250 hp. at 130 r.p.m. The two motors are connected electrically in series with each other, and also in series with the main generators. In accelerating the vessel, full torque is applied to



Shows back of "dead front" switchboard



"Dead front" switchboard is one of the features

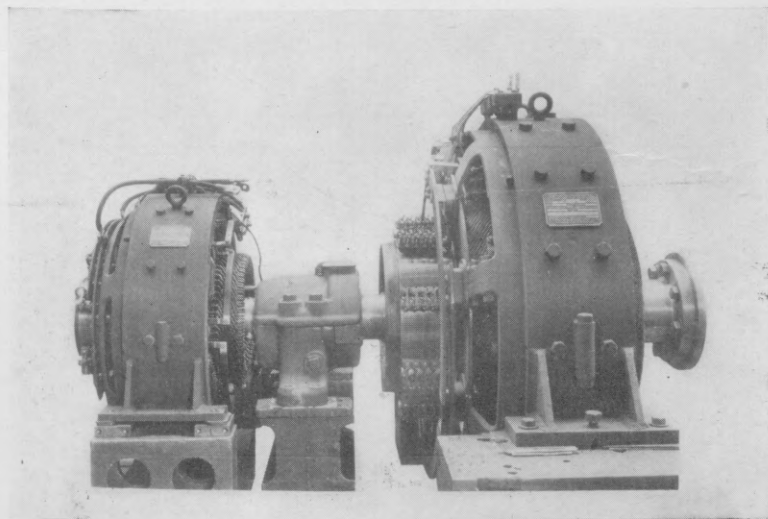
Southern Pacific Railroad Company to adopt this type of propulsion for all six of its new ferries.

The Nelseco Diesel engine generators with their switchboards comprise a veritable high efficiency floating central station, wherein power is generated for distribution to the various motor drives and auxiliaries around the ship. The principal users are the propulsion motors, which utilize the power delivered to them for driving the boat. On account of the facility with which electric power can be delivered over long distances by wires and cables,

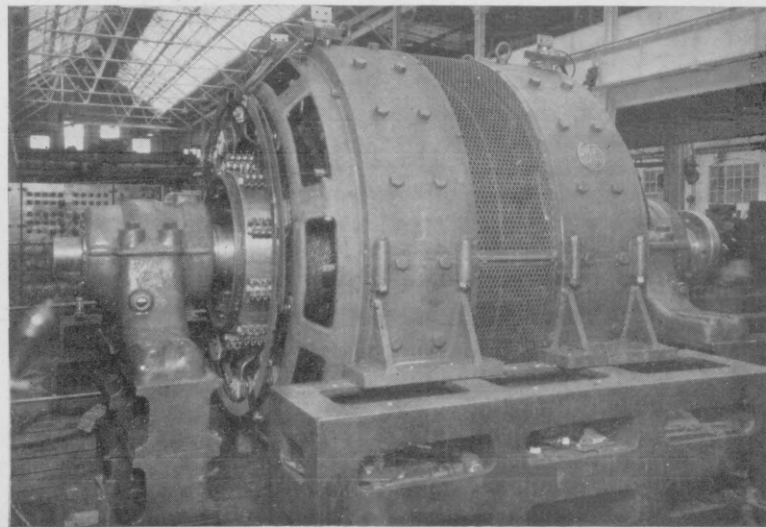
tles and the reversing gear which would be a necessary part of the equipment if the Diesel engines were required to start, stop and reverse each time the vessel maneuvered. While the engines are designed to run at a definite predetermined speed, they may be adjusted after installation to operate at slightly different speeds in order to insure running at their most effective point. The generators are then adjusted to compensate for this change, the motors run at such speed as to absorb full power, and the propeller doesn't know the difference in any way at all.

each propeller for a short period, after which the stern propeller comes up to its full speed and the bow propeller turns just enough to overcome its own resistance and friction. This action results in a high propulsive efficiency.

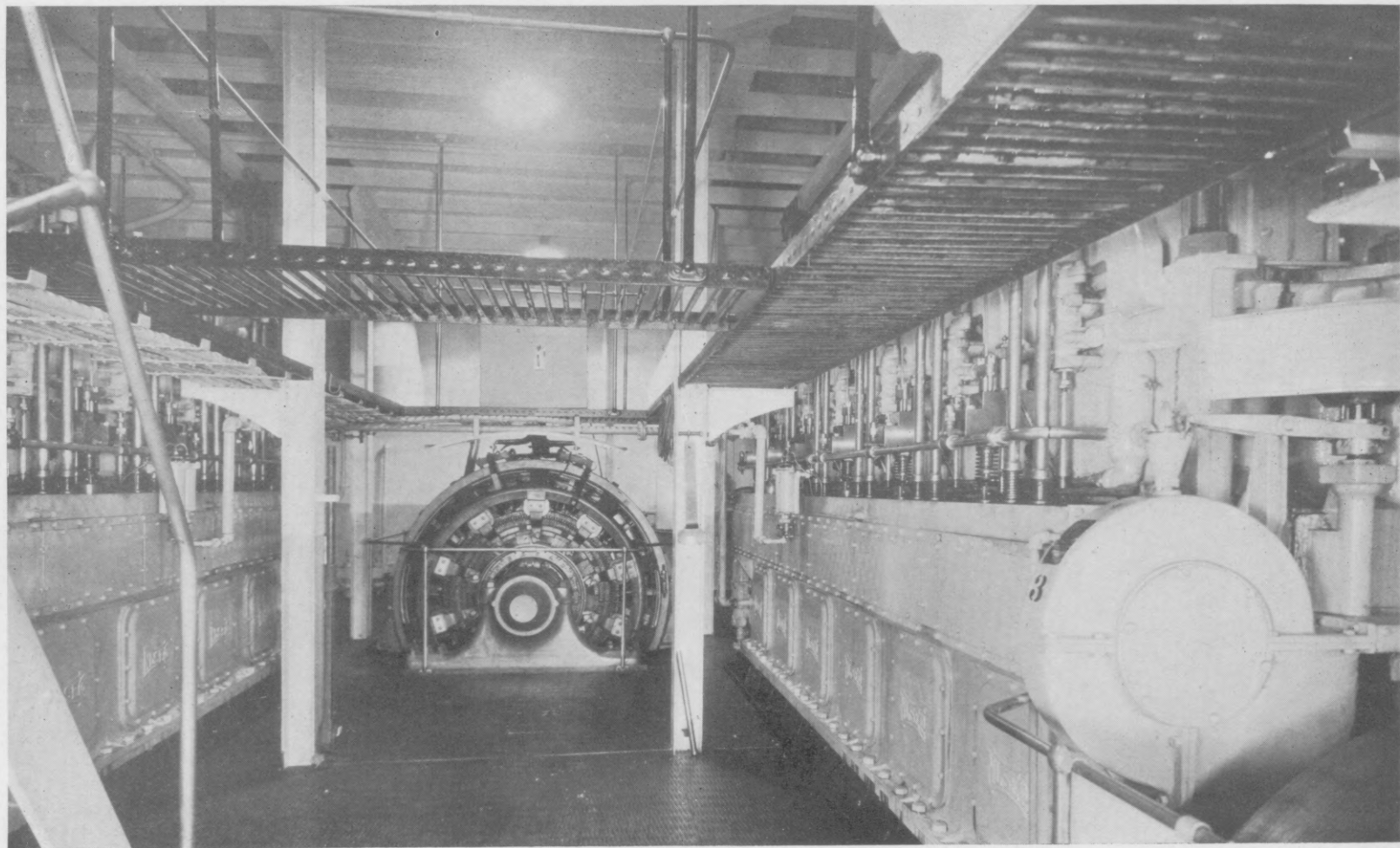
The power plant consists of four Nelseco Diesels with a main and an auxiliary generator direct connected to each engine. The main generators are each rated 275 kw., 230 r.p.m., 250 volts. The auxiliary generators are rated 40 kw., 120 volts. The auxiliary generators provide power for excitation of the main generators and



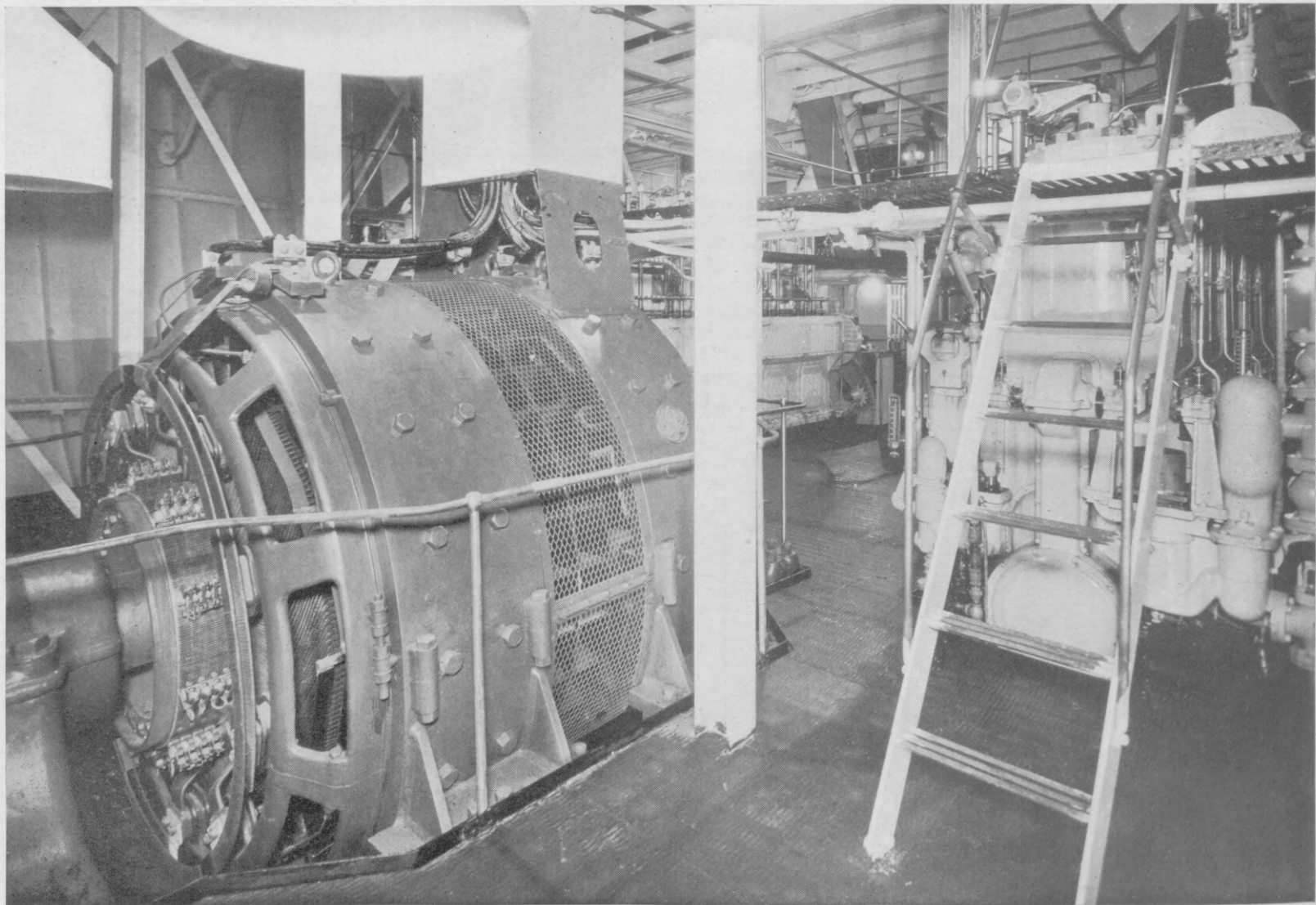
One of the four 275 kw. generators and 40 kw. auxiliary generators



One of the main double armature motors—1250 hp. at 130 r.p.m.



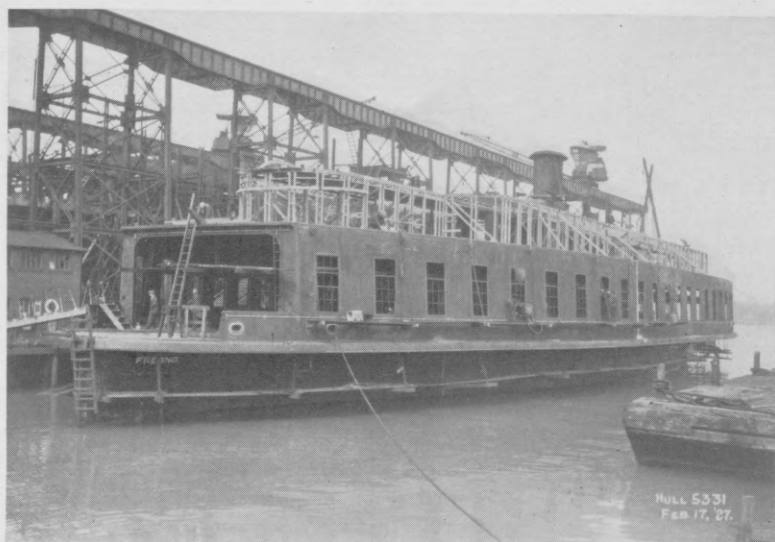
View showing main Nelseco Diesels and G. E. propelling motors on Ms. Fresno, first of the Southern Pacific Co.'s big Diesel-electric ferryboats



A 1250 hp. double armature main propelling motor in position. View gives an excellent idea of the efficiency and cleanliness of Diesel-electricity



Construction of Southern Pacific Co.'s Diesel-electric Ferryboat Fleet of Six Fast Ships



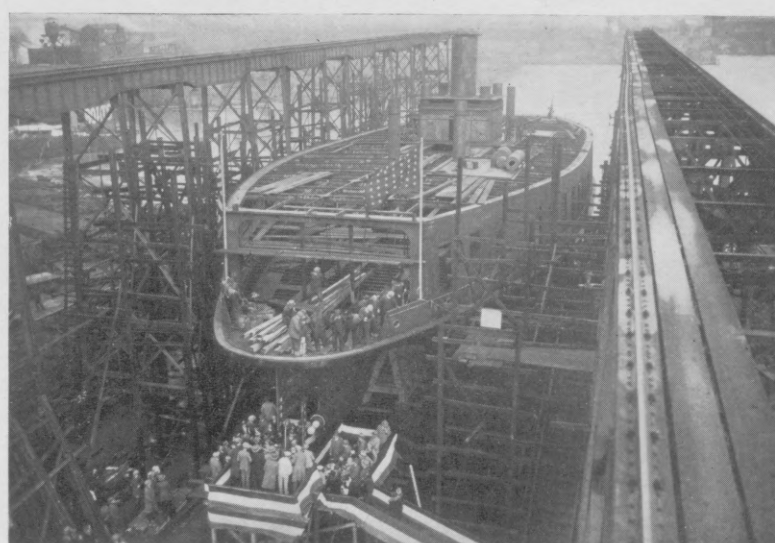
Wooden deckhouses fitting on the Fresno



Finishing up ms. Fresno, first of the fleet



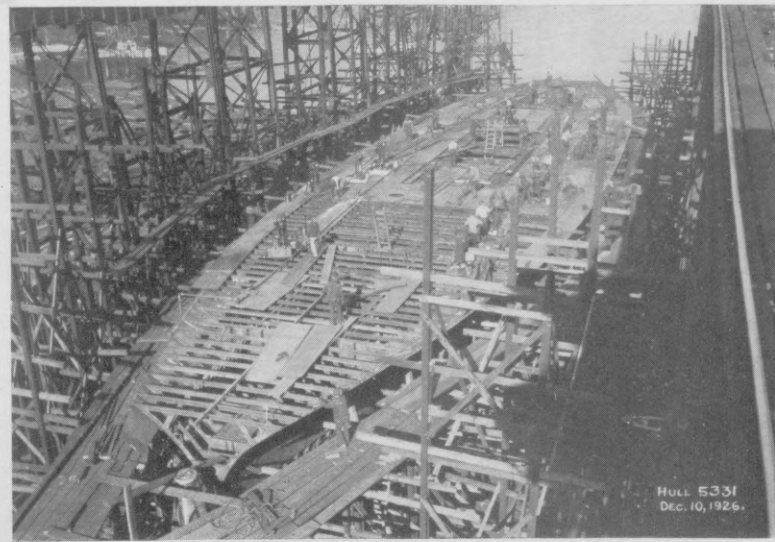
Ms. Fresno in frame



Ready for launching the Stockton



Bulkheads held in position by ribbands



Ms. Fresno in frame to the main deck



motors, and auxiliary power for the various pumps, compressors, steering gear and other auxiliaries, as well as for lighting and cooking. By direct connecting the auxiliary generators to the main engines, advantage is taken of the low fuel consumption of the main engine and of the elimination of separate auxiliary engine sets. One standby generator is provided for use when the vessel is not running and it is not desired to start the main engines.

The switchboard for controlling the output of the main generators is of the dead-front type; that is, the switches and all parts which are electrically "alive" are mounted back of the board but operated by handles, electrically "dead," extending through to the front of the board. This provides maximum safety for the engineer and his assistants and prevents accidental contact with "live" circuits.

The design of the disconnecting switches is of a novel and ingenious nature. The main circuit switch blades are sectors of copper with teeth cut on the arc of the sector. These sectors mesh with textolite pinions mounted on the operating shaft connected to the handwheel on the front of the board, and, as the handwheel is rotated, the switch is thrown from one position to another. The textolite pinions, in addition to acting as an insulating medium



Auto space on the main deck

between the "live" switch blades and the "dead" operating handwheel, also permit the operator to exert the maximum force exactly where he wishes it; namely, on the periphery of the switch blade.

The control arrangement provides for maneuvering the ship from three positions,

Characteristics of Southern Pacific Ferryboats

Length overall	256 ft. 0 in.
Length b. p.	234 ft. 0 in.
Beam, molded	44 ft. 10 in.
Beam over guards	63 ft. 6 in.
Depth at center	19 ft. 9 in.
Capacity of automobiles	95
Power Diesel engines (total)	1700 b.hp.
Power electric motors (each)	1250 s.hp.

one in the engine room and one in each pilot house. The pilot-house controllers are similar in appearance to the conventional engine room telegraph pedestals and require no additional thought or judgment beyond that necessary for an engine room telegraph. In moving the handle the operator controls directly the output of power from the main generators to the motors instead of transmitting signals to the engine room for execution there. This method of control eliminates delay and prevents any possible misunderstanding of signals between the pilot house and engine room. The various pumps and other auxiliaries are all driven by motors.

All of the electrical equipment for four of the vessels was furnished by the General Electric Company. This includes not only the main propulsion machinery but also the various auxiliary motors and controls.

Diesel-electric propulsion is no longer considered as experimental for ferryboat operation, but is being recognized as the standard, modern type of drive. This is evidenced in this case by the fact that the Southern Pacific Railroad Company, one of the foremost transportation companies in this country, in contemplating the proper drive for its ferries, decided to install Diesel-electric propulsion not for one or two but for all six of these vessels.

Diesel-Electricity Operating at One-Seventh the Cost of Steam

THREE Southern Pacific Diesel Electric Ferries, the FRESNO, STOCKTON and LAKE TAHOE are now in daily operation on San Francisco Bay. These ships in operation, are a genuine tribute to the shipbuilders' art. As they glide through the Bay waters, scarcely a ripple is set up by the displacement of the hull and the wake of the propeller suggests the minimum of disturbance.

The excellent design of the hull in combination with correct propeller and motor design, developed a speed of 13.5 knots with a 1,250 hp. main driving motor. The unique arrangement of the automobile space has made it possible to carry 100 average-sized automobiles. These 100 automobiles are carried at a fuel consumption of .14 lb. per steamer mile. The newest

Southern Pacific steamer carries 60 automobiles at a fuel consumption of .62 lb. per steamer mile. An equivalent number of automobiles, therefore, is carried by the Diesel Electric Ferry FRESNO at less than one-seventh the fuel cost of the steamer.

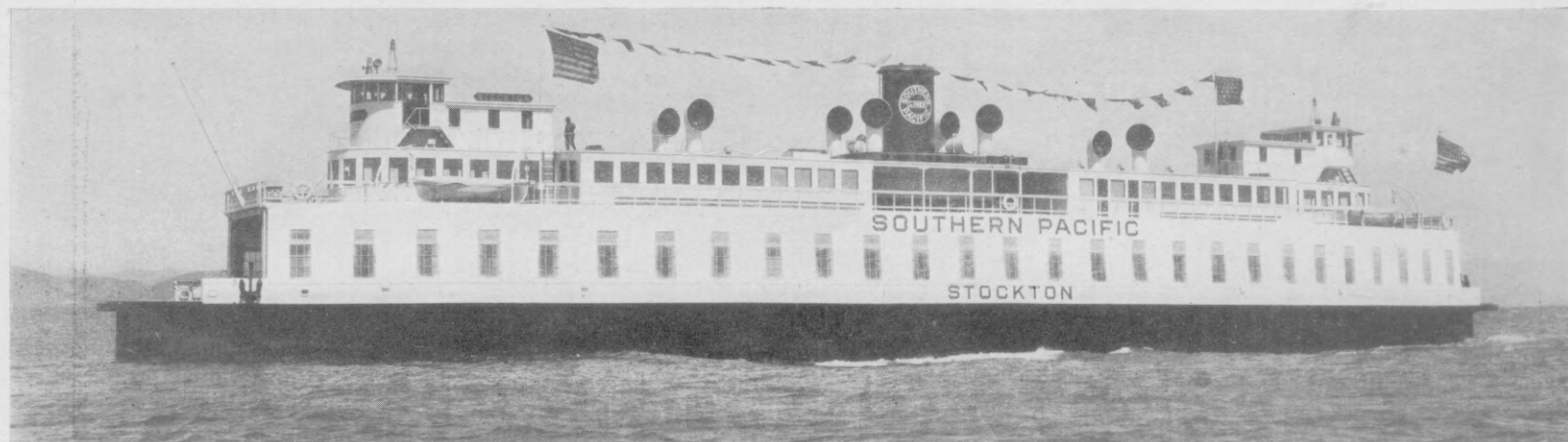
Progressive construction of the hull and superstructure from keel laying to trial trip, is revealed in the photographs, furnished by the designers of the hull, the Bethlehem Shipbuilding Corporation of San Francisco which we reproduce herewith.

The engine room photographs show the accessible and simple arrangement of the Nelseco Diesels General Electric's switchboard has been worked out to provide as simple and fool-proof arrangement as possible. One set of panels is devoted to the

generator controls and is free from any switches on the face of the board. The other set of panels is for the control of distribution circuits.

The rolled steel frame construction used in the fields of the motors, generators and exciters, has resulted in considerable reduction in weight. The new method developed by the General Electric Company for controlling the fields and the voltage of the motors when running under light load and low speed conditions, has further assisted in reducing the weight of the electrical equipment.

Operation data of these ferries of several months' duration, will undoubtedly prove of considerable interest to shipping interests and will unquestionably go to prove the soundness of the owner's choice.



Ms. Stockton, one of the fine up-to-date Diesel-electric ferries now operating on San Francisco Bay for Southern Pacific R. R. Co.



New Dredge Powered by 400 Hp. Diesel

Well Equipped Craft for Gulf Refining Co. Completed Recently
in Southern Shipyard Is Representative of Modern Practice

THE Diesel dredge, JOHN M. MILLIKEN, built under the direction of Mr. William B. Lamb, General Superintendent of the Gulf Refining Co., at Charleston, S. C., is one of the most powerful and complete dredges of its size yet completed.

The dredging machinery including pump, cutter machinery, winding machinery, spud, crane, gallows frame, A-frame, spud wells, all piping, sheaves, etc., were furnished by the Norbom Engineering Company of Darby, Pennsylvania. The pump has a 66 in. diameter runner travelling at 277 r.p.m. This comparatively large diameter at slow speed gives a much longer life pump than a smaller diameter runner at a high speed. All the principal parts are of cast steel of extra heavy construction. The runner has a large throat opening and the passages are so shaped as to give the least resistance to the material when changing from an axial to a radial flow. The detrimental clearance between the throat and the runner is taken care of

by an adjustable cast iron throat ring at the side entrance to the runner. This ring can be manipulated from the outside without shutting down the pump. The runner is screwed on the shaft with a taper fit just ahead of the throat which makes quick removable possible. The end thrust is taken by a 3-collar marine type horseshoe

Characteristics of Dredge John M. Milliken

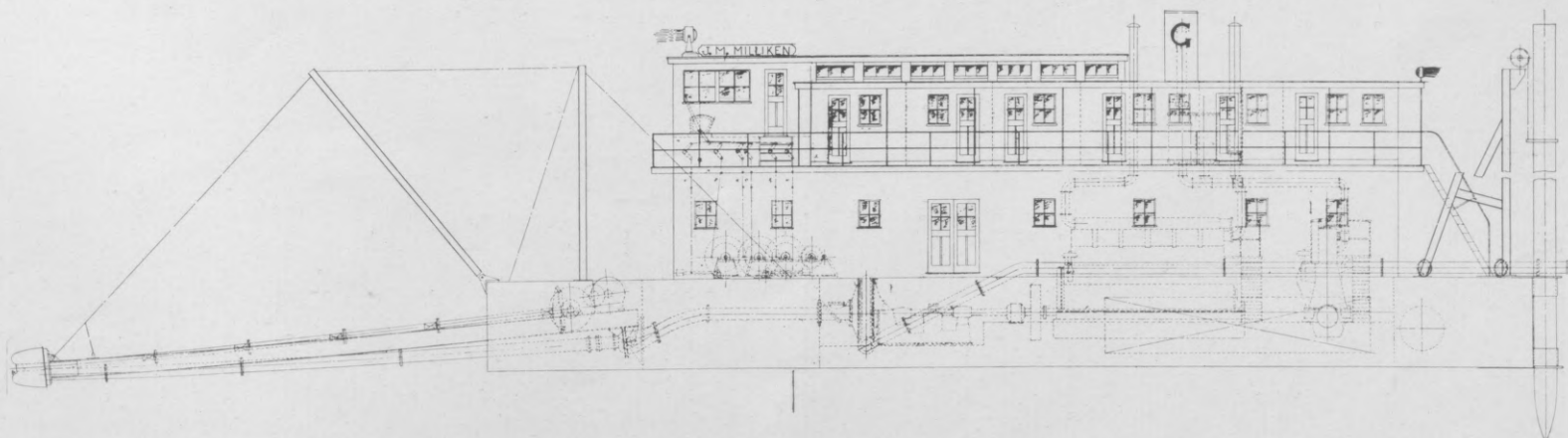
Length molded	95 ft. 0 in.
Breadth molded	30 ft. 0 in.
Depth molded at sides.....	7 ft. 9 in.
Depth at center line molded.....	8 ft. 0 in.
Camber	0 ft. 3 in.

thrust bearing. A bronze sleeve protects the shaft where it passes through the stuffing box and the stuffing box is water sealed. This pump is direct connected to the engine through a Francke flexible coupling with a shearing attachment.

The cutter machinery is 57 ft. in length, and is capable of digging 35 ft. below the water level. The main members of the ladder are 18 in. "I"-beams. The motor is a Westinghouse 50 hp. fully enclosed marine type and the gearing of cast steel with cut teeth. The ladder head is designed to fit the cutter ring to avoid leakage past this point.

The winding machinery is of extra heavy construction, all gears being of cast steel with cut teeth. The drums are fitted with V-shaped friction blocks, and the drums are also fitted with graphite-inserted oil-less bushings. This equipment is designed so that the thrust between the male and female is taken care of in the shaft itself. The counter-balanced band brakes are Raybestos lined with provision for takeup. The winding machinery is driven by a Westinghouse 30 hp. fully enclosed motor.

All of the frames are of structural steel, generously proportioned. The spuds are 24 in. diameter and the guy ropes are 1½ in. diameter, and concealed in the house



Inboard profile of the modern Diesel driven pipe line dredge John M. Milliken, showing arrangement of Diesel machinery and dredge pumps



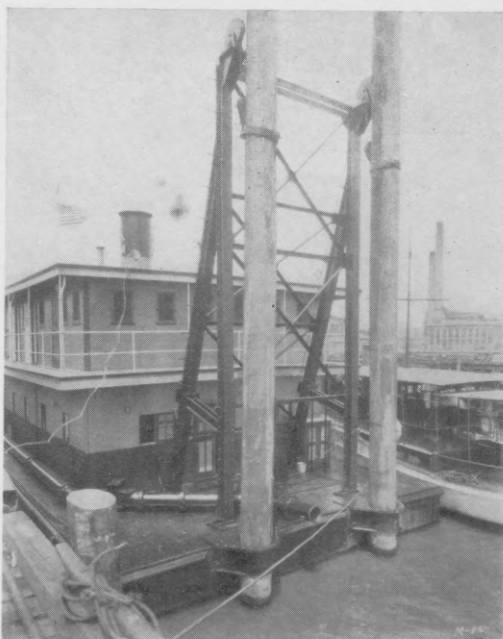
Dredge machinery controls

and arranged so as to give the least possible obstruction. The spud lifts run underneath the floors.

The suction pipe is carried through a water tight bulkhead immediately forward of the pump, with a stuffing box. All the hull piping is lap-welded and all the bends are of cast steel. The discharge pipe is carried on deck and a check valve provided in this line. Bitts, chocks, bollards and deck scuttles are provided in the deck for use of handling and efficient operation.

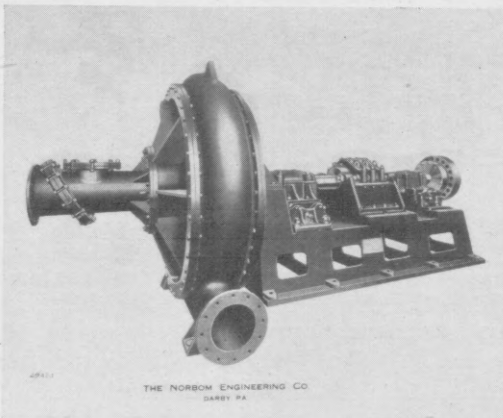
The main engine driving the dredge pump is a 6-cylinder De La Vergne airless injection Diesel engine, rated at 400 b.h.p. at 277 r.p.m. This engine is especially adaptable to this work due to its simplicity of construction, high economy on fuel and lubricating oil and conservative rating which gives dependability under constant load conditions. A control has been developed by the De La Vergne Machine Company especially for this dredging service which allows the engine to run on the throttle and the operator may thus control the torque and speed under any condition. With this control, any dredging condition under which the dredge may be working is met within the capacity of the engine.

A generating set is also fitted, comprising a 2-cylinder De La Vergne Diesel engine rated 130 hp. at 277 r.p.m. and direct connected to a Westinghouse 125-250 volt 3-wire generator. Special marine type outboard bearings have been provided on both of these engines by the De La Vergne Machine Company.



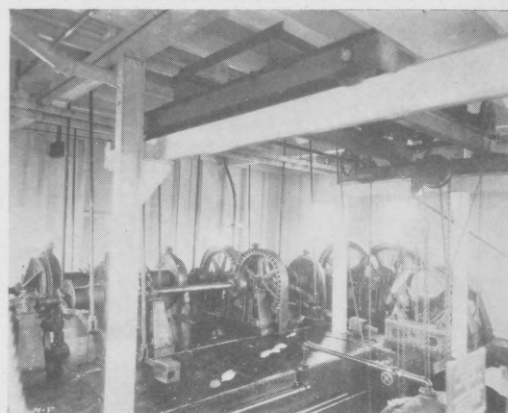
Two 24 in. wooden spuds

A standby generating set is also fitted consisting of a 2-cylinder 12-14 hp. Hill Diesel direct connected to an 8 kw. 125-250 volt Engberg generator. On the same



Main dredge pump

base with this auxiliary generating set is a clutch controlled Ingersoll-Rand air compressor for providing starting air and also a clutch control, fire and bilge pump, which make this unit complete for all ordinary port service when alongside the dock.



Hoisting machinery forward

There is also a 2 kw. Kohler generating set which will take care of lights, fans and refrigerator when the dredge is not in service. This plant is automatic and starts and stops as current is required.

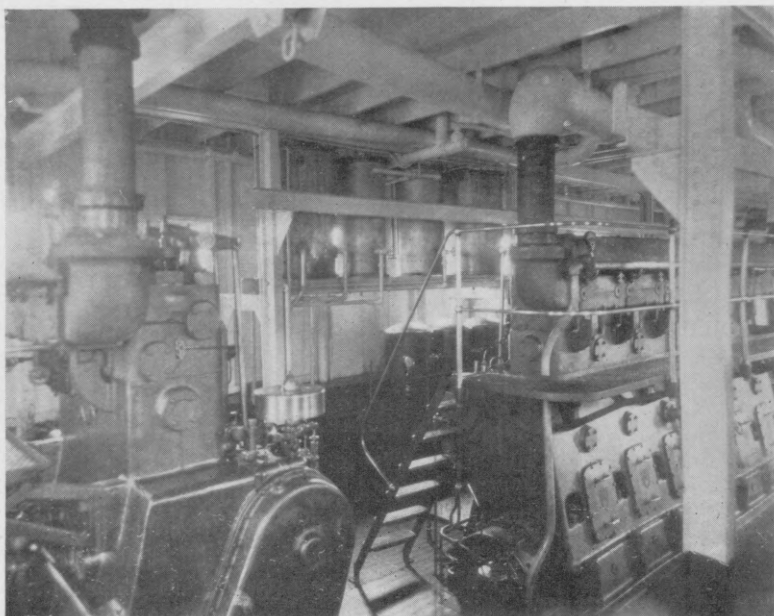
The electrical equipment is very complete, and a switchboard is provided with 125 volt and 250 volt busbars so arranged as to take the current from any one of these units and distribute as required. Interlocking and double throw switches are provided so that there will be no danger of operators injuring any of the generators. The engine room auxiliaries are piped so as to provide spares for practically any emergency.

All ordinary repairs will be taken care of by the dredge crew and an engine lathe, drill press and grinder are located in the engine room. Work benches, vises, lockers and tools are provided.

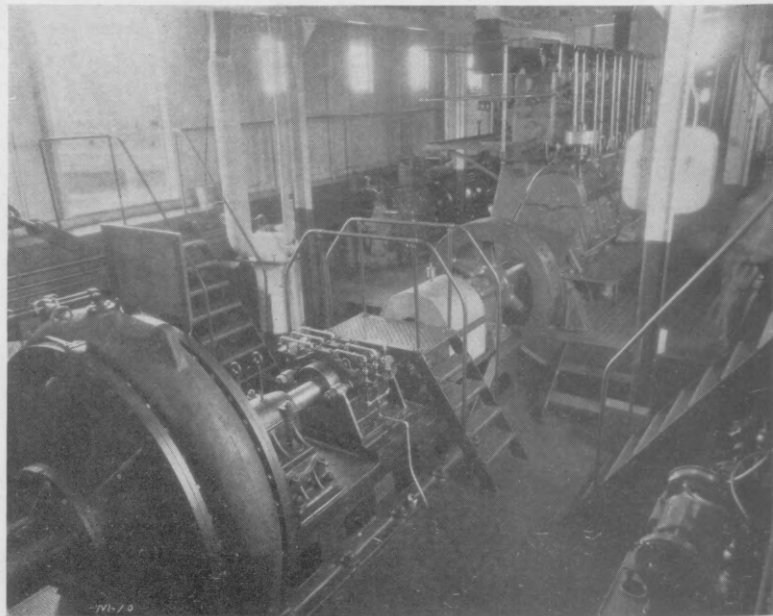
A 3-ton travelling crane equipped with a 1½ ton chain fall spans the engine room and makes it possible to work efficiently on the machinery.

The hull is of steel, of stereotyped suction dredge form, with bow well for the dredge ladder. The house over the machinery well, 10 ft. high, is of wooden construction as is also the structure above this which has a lever house at the forward end and crew accommodations abaft this. The crew house is 7 ft. 6 in. high. The two spuds are solid wooden booms.

The equipment of the quarters is especially complete, the lever room is large



Back end of main engine and generating set



Main 400 hp. Diesel and dredge pump unit



Wm. B. Lamb, general superintendent, Gulf Refining Co., Jacksonville, Fla.

and has clear vision to all sides of the horizon. The levers are made of polished manganese bronze. Indicating and recording gauges are furnished for suction and discharge lines and searchlights fore and

aft provided for efficient dredging at all times. A Strombos Air Chime whistle has been provided and whistle cord runs to the lever room.

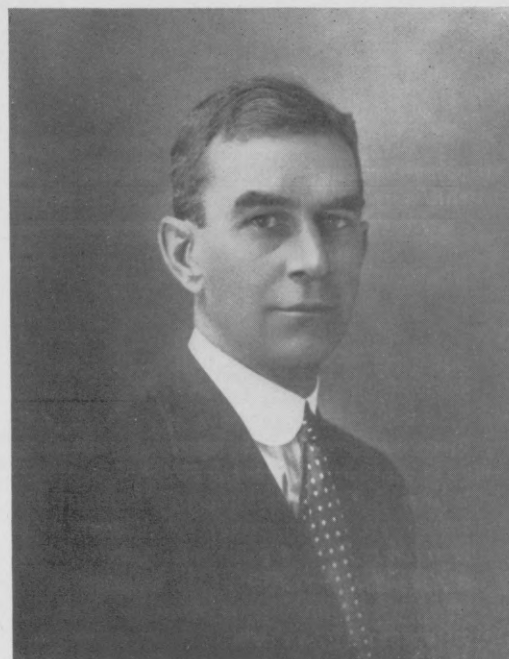
The captain's and chief engineer's rooms are immediately aft of the lever room and equipped with private showers and toilets, lockers, built-in berth with drawers under, and lavatories. The balance of the crew have double rooms, large and spacious, with lavatories and lockers and standard pipe berths. A large well ventilated wash room and toilet is immediately aft of the crew's room. The galley is large and well lighted by doors and windows, and has besides full equipment, a Kelvinator refrigerator in the pantry adjoining.

The mess hall occupies the after end of the house and is equipped with a large table and benches.

A skylight runs fore and aft over the center of the house and opens into each room as well as the passageway, so that there should be no lack of ventilation and light. The quarters are screened throughout.

Through the center of the house is run an air trunk, on top of which is a stack and which contains the mufflers for the engine.

An Arcola hot water plant is installed in the engine room and heats the quarters in



John M. Milliken, chief engineer of construction, Gulf Refining Co.

cold weather. The operation of this is almost human in that the control is by a mercoid switch and a thermostat regulates the temperature.

New 160-Ft. Diesel Automobile Ferry for Puget Sound

THE past two years have seen a large number of large oil engined automobile ferries put into commission on Puget Sound and British Columbia waters where the ever extending highway systems have made possible the opening of addition and shorter routes for the motorists. The latest vessel to join the fleet is the 160-footer QUILLAYUTE designed by M. MacNaught of Seattle and built by the Winslow Marine Railway & Shipbuilding Company for the Sound Ferry Lines, Inc., of Edmonds, Wash.

The QUILLAYUTE is a 60-car vessel and operates on the 16-mile run from Edmonds to Port Ludlow, thus opening another direct route from Seattle to the extensive highways of the Olympic Peninsula and providing a more direct route to Victoria,

B. C. The boat was constructed under cover in 82 working days, 12 days under the time called for in the contract.

The launching ceremony took place April 30th and was attended by a large number of prominent Puget Sound shipping men. Soon after launching, the QUILLAYUTE was towed to the Seattle Port Commission docks where the two 375 b.hp. Diesel engines were installed under the supervision of Marshall McGinitie of the Washington Iron Works, builders of the engines. The details of the installation were carried out under the direction of A. O. Hinsch, chief engineer of the ferry. Exactly seven days after the engines were lowered into the hull, the ferry was ready for her trial run, a record for speedy installation.

The QUILLAYUTE is a twin screw single

end ferry of the latest type design and construction. A feature of the arrangements is a large observation saloon fitted with comfortable chairs and affording a splendid view of the Puget Sound scenery through which the vessel passes on her daily trips. There is a commodious ladies' cabin, a smoking cabin and lunch room. The galley is equipped with a large ship's range with oil burner, electric warming oven and electrically operated refrigerating machine. On the boat deck are eight staterooms for the officers and for passengers besides the large pilot house. Quarters for the crew are provide in the fo'c's'le below.

The main engines on the QUILLAYUTE are two six cylinder Washington-Estep Diesels of the latest design. They are 13½ in. bore by 18 in. stroke airless injection direct reversing units and develop their rated horsepower at 250 r.p.m. giving the ferry a maximum speed of 14 knots. Each engine turns a three bladed propeller 72 in. pitch by 74 in. diameter. The engines are fitted with Madison Kipp lubricators and with special mufflers supplied by the Washington Iron works.

The auxiliary unit consists of a two cylinder 24 hp. Viking oil engine direct connected to a 15 kw. Westinghouse direct current generator and clutch connected to a single stage Worthington air compressor. This compressor furnishes air for starting and also for the steering gear through a reducing valve. A 10 kw. generator is belt driven from the port main engine. The two generators charge an 18-cell set of 100 ampere hour capacity Edison storage batteries and the whole electrical system is centralized in a switch-board against the after bulkhead of the engine room.



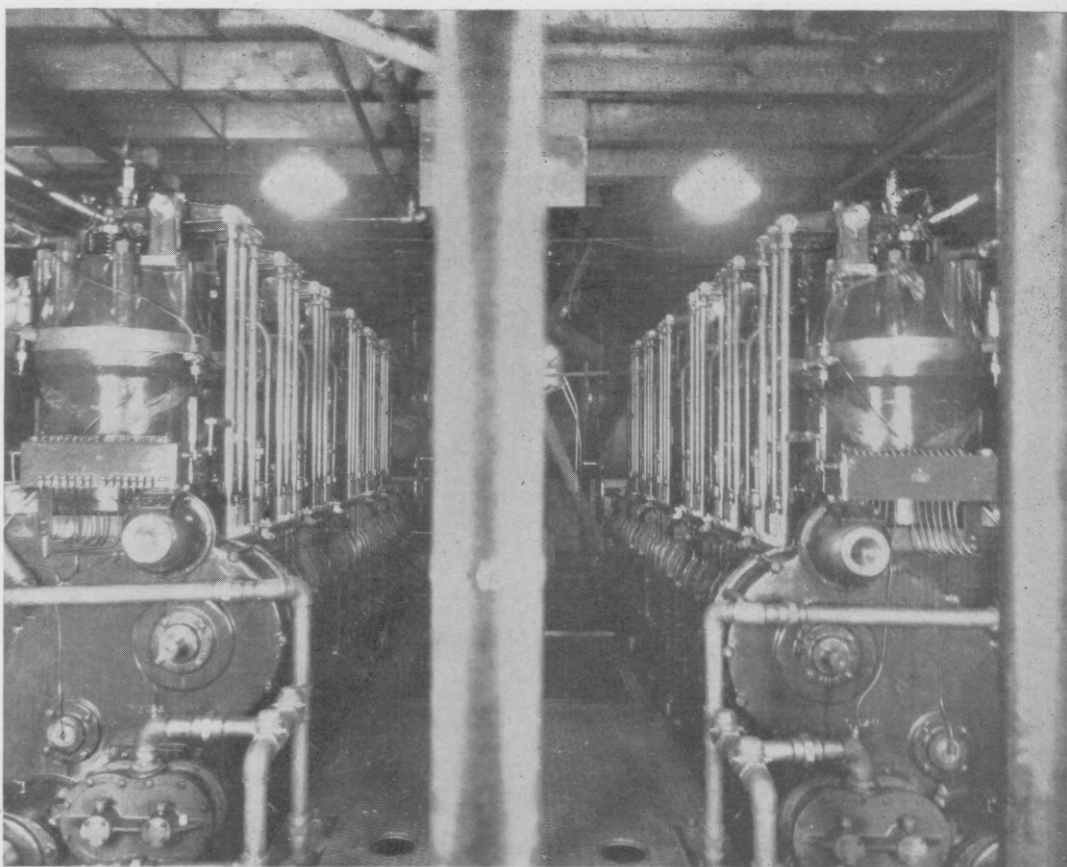
Diesel ferry Quillayute, for Puget Sound work, has two 375 Washington-Estep engines

All pumps are electrically operated and are interconnected by manifolds so that any one of them can be made to perform the duties of any other in emergencies. There is a 3-in. suction by 2½ in. discharge pump driven by a 10 hp. motor for fire protection. A 2½ in. by 2 in. centrifugal pump driven by an 8 hp. motor is used for the bilge and the sanitary system and there are smaller pumps for the fresh water system. All piping is copper and internal sea strainers are provided for all intakes.

The QUILLAYUTE is controlled by double engine room telegraph from the pilot house on the boat deck, with bell signals and speaking tubes for emergency use. Supplementing the compressed air steering gear is a powerful hand gear which is brought into service by removing a lock pin. The ferry is heated throughout by an Ideal steam system with the oil burning boiler in the engine room. Fire protection is assured by a complete sprinkler system in the holds and crew's quarters and by numerous Pyrene chemical extinguishers. There are also hydrants connecting with the ship's main pumping system on the main, passenger and boat decks.

The economy of the Diesel ferry is clearly shown by the fact that the QUILLAYUTE can operate for two months without refueling. There are three Diesel oil tanks of 5,000 gal. capacity each. Six barrels of lubricating oil are carried and 5,000-gal. of fresh water. The engine room crew consists of three engineers, three oilers and one wiper.

The construction of the hull is very strong, with extra heavy fir members. The keel is fir molded 15½ in. and sided 15½ in. with an ironbark shoe 2 in. thick. The keelson is molded 15½ in. and sided 11½



Two 6-cylinder 375 hp. Washington-Estep Diesels on the 160 ft. ferry Quillayute

in. The frames are on 24 in. centers of 4¾ in. flitch in two members molded 12 in. at the keel, 10 in. at the turn of the bilge and 8 in. at the deck. The hull is stiffened by heavy fore-and-aft trusses. Steel bulkheads are provided at either end of the machinery space and the filers for the engine foundation are sided 9½ in. and molded

11½ in., thus ensuring a very strong job.

Capt. J. H. Payne, one of the best known marine men on Puget Sound, is president of the Sound Ferry Lines. Associated with him as general manager is Capt. O. Joyce. Capt. O. Tangorose is in personal charge of the QUILLAYUTE and A. O. Hinsch is chief engineer.

Design Improvements in Panama Tugs

THE two new 750 hp. 125 ft. Diesel-electric towboats building for the Panama Canal are at the present time the largest and most powerful towboats in the world.

Living accommodations, states *The Panama Canal Record*, are provided for six "gold" or American men and 24 "silver" or tropical employees. One tug, for the present, is being equipped with the latest radio equipment. Each boat is being equipped with very powerful electric towing machines, equivalent in capacity and size to that of the largest steam tugs.

Two definite steps in advancement of towboat design have been included in the design of these hulls. The first of these is the installation of bulkheads and double bottoms as necessary, in order to make the tug a one compartment ship; that is to say, it will be possible for the tug to remain afloat with one of her main compartments bilged. The second change in design is the cutting away of the deadwood aft and installing a simple casting in the way thereof. This is expected to improve the handling qualities of these large tugs a great deal. It is probable that, regardless of the length of these two boats, they will

be just as handy as are the small harbor tugs now employed on the Canal.

The main propelling machinery, comprising Ingersoll-Rand 480 hp. Diesels and General Electric electrical equipment on each tug will be fitted with Diesels, driving a direct-connected 330-kw. direct-current 250-volt generator and on an extension shaft a 50 kw. direct-current exciter. The two main generators will, operating in series, drive a double armature 750 hp. direct-current motor. This motor will be direct-connected to a single propeller approximately 10 ft. 6 in. in diameter, designed to turn from 115 to 140 r.p.m. when developing full power. All auxiliaries will be driven from the power developed by the two exciters when the main engines are in operation.

As auxiliary power each tug will be equipped with a 10-kw. generator driven by a direct-connected 25 hp. 4-cycle Diesel. An air compressor of suitable size can be driven on an extension of the auxiliary generator shaft through a clutch, and an independent compressor, motor-driven, will be installed in each boat. The motor for this compressor is to be automatically controlled from the air pressure in the start-

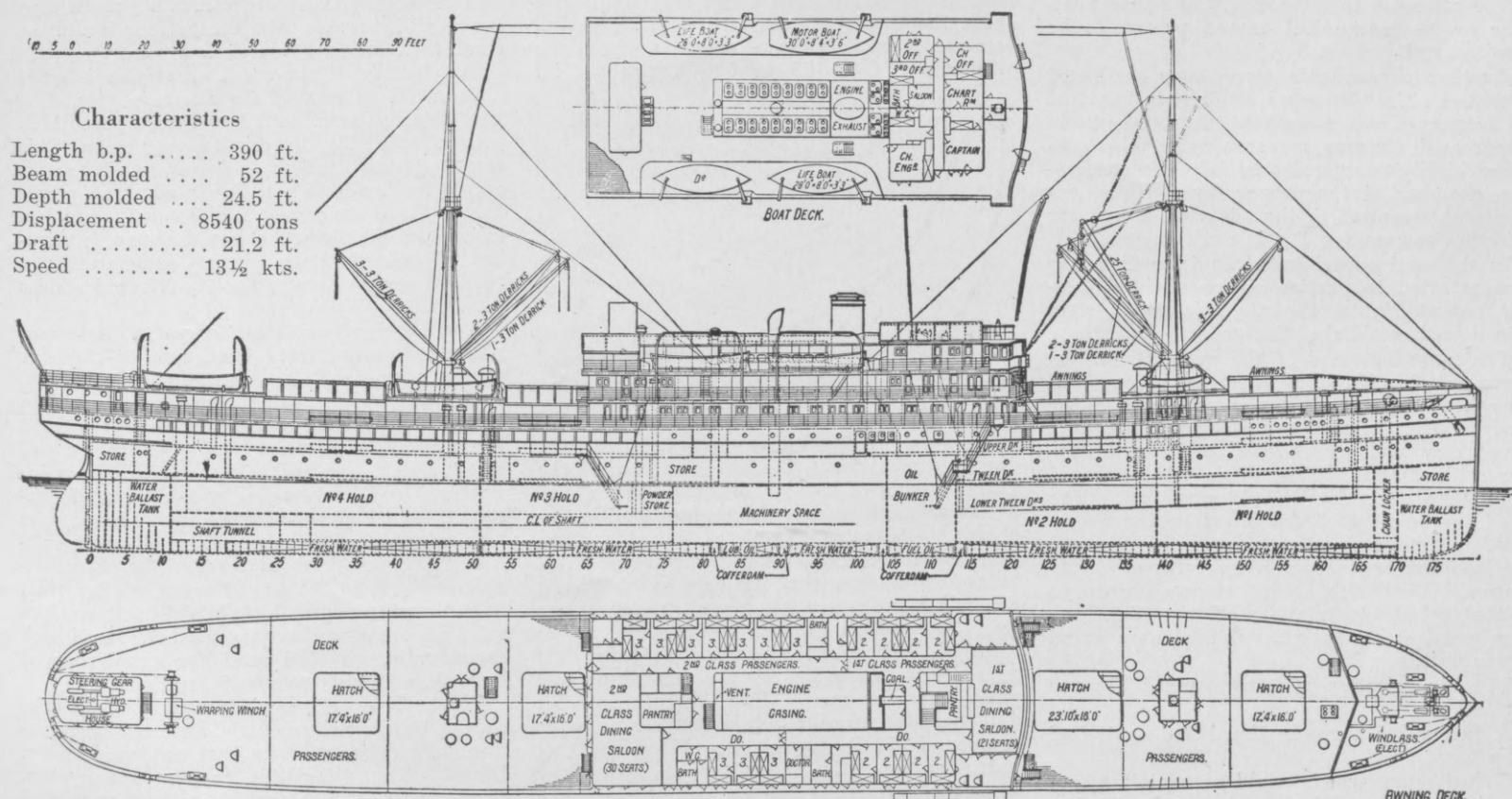
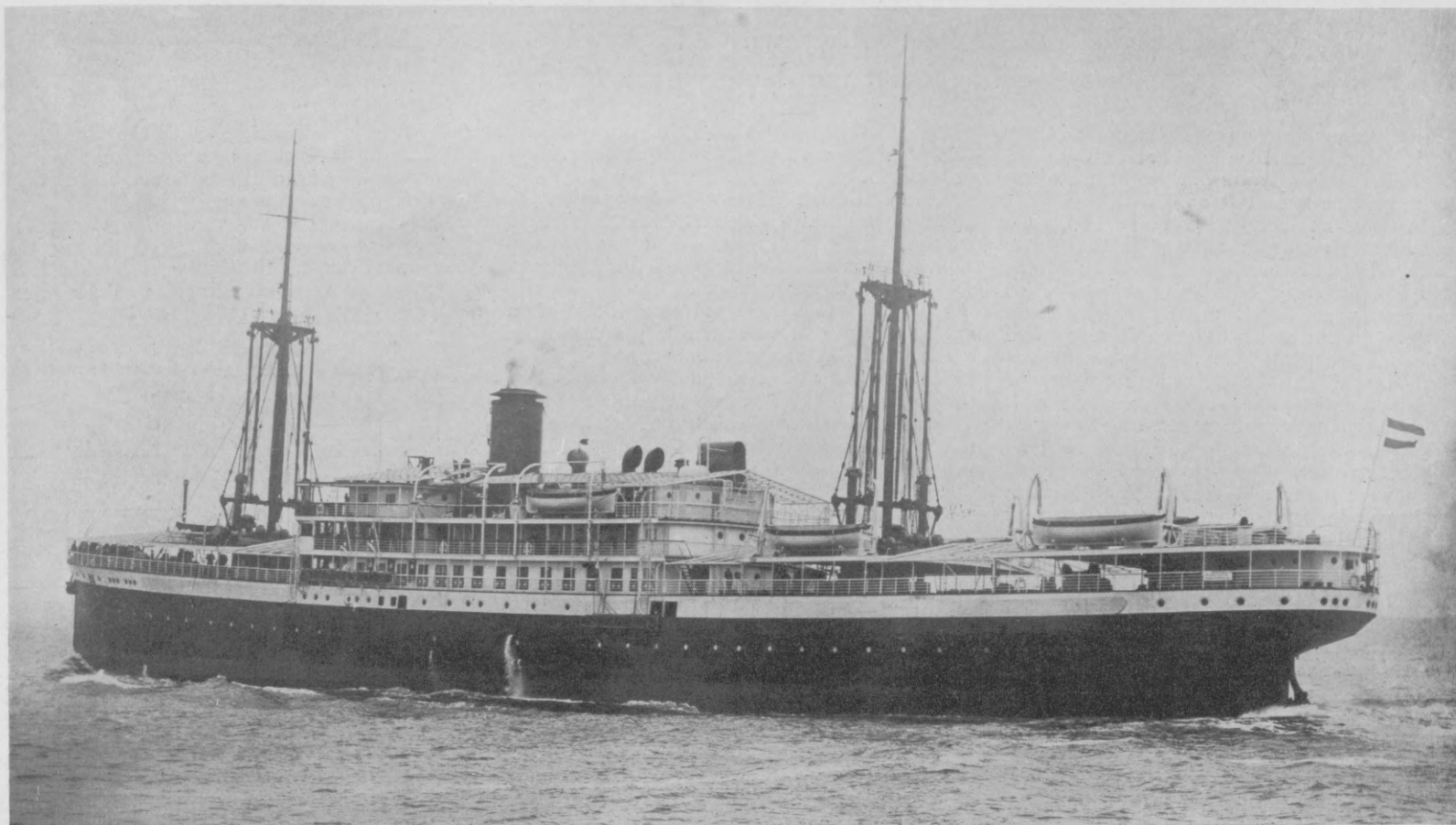
ing air tanks of the main engines, which will insure maximum pressure for the starting air being available continuously.

Each tug will be equipped with a motor-driven centrifugal fire pump, capacity of which is 1,000 gal. per min. at 100 lb. pressure. It is intended to equip the tugs so that this pump may be used as a salvage pump as well. Lighting circuit and power for the ice machine motor and sanitary pump motor are taken from 125-volt mains. This voltage is obtained by stepping down exciter voltage through a motor generator. Each tug is equipped with a second motor generator which will convert the 25-cycle 230-volt current Canal Zone to 125-volt direct current, for use on the tugs. This will permit the tugs, while lying at dock, to enjoy the comforts of lights, sanitary system, and refrigeration without running any machinery aboard the tug.

The fuel oil capacity of each tug is sufficient to give at least 21 days' endurance.

"All our oldest ships are being replaced by those equipped with Diesel engines," said Lord Bearsted, Chairman of the Shell Transport and Trading Co., at the stockholders' annual meeting on June 21. "Our shipping resources of 1,646,696 tons capacity carried 12,859,000 tons of oil cargo in 1926."

Motorships Replace Steamers in Dutch East Indies



General arrangement of the tropical service passenger and freight carrying motorships *Van Heutsz* and *Cremer*

Courtesy The Marine Engineer

TWO motorships have been placed in service between Belawan, Sumatra, and Amoy, China, by the Koninklijke Paketvaart Maatschappij. The first vessel ms. CREMER, 4,500 tons gross arrived at Tandjong Priok on December 4, and the other vessel, ms. VAN HEUTSZ, a sister ship, on December 13, and the old steamers VAN CLOON and VAN OVERSTRAATEN,

have been taken off the run. A new service will be started between Saigon, and the Ports of the Molucca Islands of Netherlands India, by the Koninklijke Paketvaart Maatschappij, for the purpose of carrying rice which is not grown in sufficient quantities in this colony to supply the needs of the inhabitants. Definite plans have not been made as to the ports

which are to be included in this service.

The two new ships are of open awning deck type. Ms. VAN HEUTSZ was built and engined by the De Schelde Co., Flushing Holland and has two 6-cylinder 2500 hp. Schelde-Sulzer engines, while Ms. CREMER was built by the Nederland Sb. Co. and engined with two 6-cylinder 4-cycle Werkspoor Diesels of 5000 collective hp.

Small Mechanical Injection Diesels—I

This Article Deals Particularly with the Development of Mechanical Injection Diesels for the Requirements of the Pacific Coast

THE unique development of the mechanical injection Diesel on the Pacific Coast of America has reached a point at which it is important to reflect on its history. The Pacific Coast can feel justly proud of the remarkable achievements attained in the airless injection Diesel engine. In few parts of the world has the small Diesel engine been given such prominence, such earnest advancement and development and such general acceptance by the marine public. . . . The term "Small Diesel engine" can be defined as engines of approximately 50 b.hp. per cylinder and under.

The Diesel engine presented to the world by Dr. Diesel, after years of experiment, was an air injection unit. The problems encountered by him were many and great difficulties were experienced in controlling the combustion of fuel within the engine cylinder.

After the first attempts to produce an engine which would operate on the Carnot cycle, an engine was designed resembling other 4-cycle internal combustion engines. The essential novel feature of this unit was the method by which heat was added to the system. Fuel was introduced under pressure into a combustion chamber containing air compressed under adiabatic conditions. The temperature of the air within the combustion chamber was supposed to be high enough to guarantee ignition of the fuel when introduced close to the end of the compression period. These attempts to introduce fuel under pressure or by mechanical means proved to be unsuccessful.

Further experiments were then conducted with the object in mind of introducing fuel by means of air pressure. In this system compressed air was to serve as a vehicle to carry highly energized fuel into the combustion chamber at the proper time. These experiments resulted in the adoption of the air injection system for Dr. Diesel's engine.

In the final experimental engine which was demonstrated to parties interested in obtaining patent rights, the air injection system was a well established feature.

The manufacturers of the early Diesel engines constructed air injection units. Although the early engines were designed for land service, the marine field in a short time gave every evidence of great promise for the use of the Diesel engine. This field appeared more promising for the larger sizes. The chief development of the Diesel engine, therefore, was toward large powers. The small air injection engine did not receive much attention. Until the recent economic changes in the fuel situation appeared, the Diesel engine was not seriously considered as a small power unit.

The air injection system required the use of:

A fuel valve properly timed and controlled by a cam.

A fuel pump which would accurately measure the quantity of fuel necessary for the immediately ensuing combustion period and which would deposit this measured quantity above the atomizer element in the fuel valve before combustion commenced.

A high pressure air compressor with which to atomize the fuel and to inject the charge into the combustion chamber.

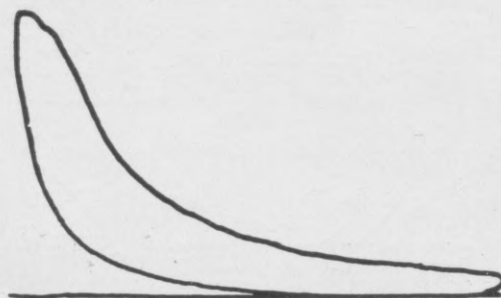
This system was developed by individual manufacturers to a high stage of perfection. The Augsburg type of fuel valve developed at the Augsburg plant of the M.A.N. Com-

pany, is today used in many of the representative air injection engines such as Burmeister & Wain, Sulzer, etc.

The Hesselman valve was developed in the plant of the Aktiebolaget Diesels Motoren of Sweden. This system is used on the Swedish Atlas, the British Neptune and the American McIntosh & Seymour engines.

The Augsburg fuel valve consists of a spring-loaded fuel valve needle placed within a valve body. This needle is opened and closed by cam movement. Around the lower end of the fuel needle the atomizer element is placed. This atomizer element consists of a number of plates into which holes are drilled in such a way that the fuel is forced to travel over an interrupted path. A pulverizer cone is placed below the atomizer plates. The atomizer plates and the openings provided are so designed that they furnish a retarding or braking influence on the flow of fuel into the combustion chamber. The atomizer cone provides considerable wetted surface which permits the high velocity injection air to tear off very fine particles of fuel and to carry these atomic particles into the combustion chamber in the form of a fine mist.

The braking or retarding influence is necessary to control the rate of feed of fuel into the cylinder. In the Diesel cycle, as it is ordinarily understood, the pressures during the combustion period should not materially rise above the compression pressure. In practice, however, there is a rise of pressure within the cylinder of from 25 to 50 lb. per sq. in.



during combustion. The indicator card of the Diesel engine of the air injection type shows a flat or slightly rounded combustion line as shown. The retarding element is, therefore, designed to regulate the rate of feed of fuel in such a manner that the combustion line is controlled or the maximum peak pressures are held down within the desired values.

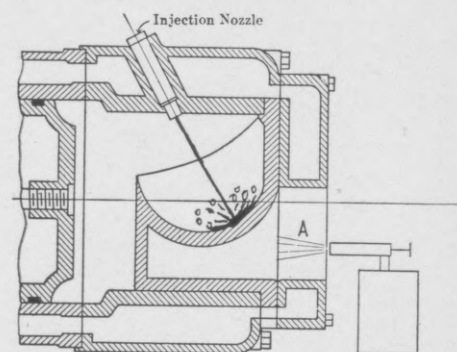
In the Augsburg valve the injection air pressure is determined by the amount of fuel which must be carried into the cylinder. At full load, therefore, the injection air pressure is around 950 lb. per sq. in. When the fuel valve needle lifts the pressure above the atomizer element is 950 lb. per sq. in. The pressure within the cylinder is about 450 lb. per sq. in. This difference in pressure causes a flow of the injection air at a very rapid rate through the atomizer element and carries the fuel into the cylinder with it.

In the Hesselman valve, injection air at high velocity, tears off fuel particles from an annular ring of fuel. The fuel is fed to this annular ring at a regulated speed by virtue of the constant difference in pressure between the source of fuel and the ring.

Both of these systems and others have be-

come firmly established and the accessory units such as fuel pumps and compressors, have been developed to such a stage that they are thoroughly dependable.

The demand for submarine Diesel engines of large power and high speed during the years previous to 1910 presented difficulties with high pressure air compressors for injection purposes.



These difficulties, together with the problem of controlling high pressure air leakages within the submarine when submerged, prompted the British firm of Vickers, Ltd., to undertake the same experiments as those conducted by Dr Diesel on mechanical injection. The results of these experiments proved that the high pressure air compressor could be eliminated for fuel injection.

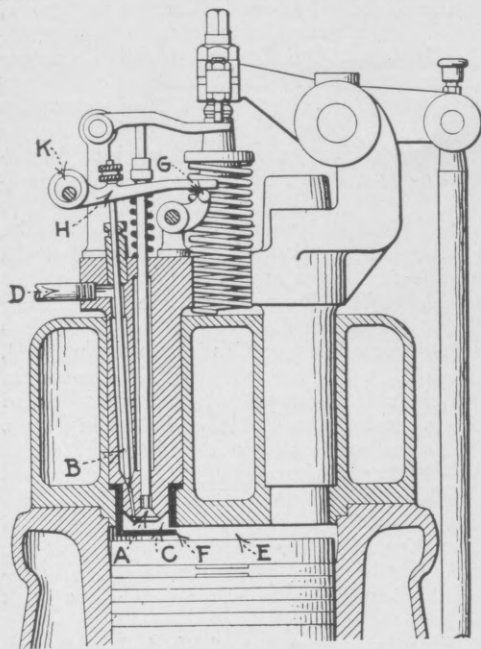
The history of the small oil engine is quite different from that of the Diesel engine. The gas engine developed by Otto about 1870 proved to be ideal for small power units. This engine gained such great favor that its application was made in practically all small power fields. Until the cost of fuel became a problem in isolated districts, the gas engine was popular. When distillate became expensive as a fuel, oil engine development took rapid strides forward.

A number of small air injection Diesel engines were constructed from time to time for special purposes. In France units of 5 hp. were built as auxiliaries for submarines. In Sweden units as small as 3 hp. were built largely to demonstrate the practicability of small Diesel engines. In each of these instances the Diesel engine was of special construction and of high initial cost. In no case was an engine constructed in small units suitable for commercial purposes. The objectionable features in the use of small air injection Diesel engines were: high initial cost; troublesome air compressors when used for small high speed units, and the need for simpler speed controls and greater speed flexibility.

The early development of small engines capable of burning cheap fuels, assumed construction quite different from that employed by Dr. Diesel. The difficulties encountered by Dr. Diesel with mechanical injection, prompted those who endeavored to eliminate the air compressor from their oil engine designs, to refrain from the use of the high compression Diesel cycle.

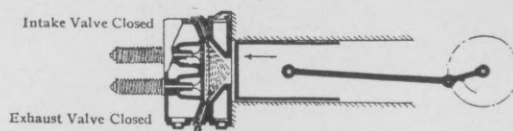
The first oil engines using the mechanical injection of oil fuel into an engine cylinder were of the surface ignition type. In this type of engine a jet of fuel at low pressure was deposited or allowed to impinge upon a hot surface as illustrated above. The fuel during the compression period vaporized to such an extent that ignition occurred approximately

near the end of the compression stroke. In this type of engine ignition depended upon the temperature of the hot surface and the compression pressure. As both of these values varied from time to time ignition was rather uncertain and the difficulties encountered in endeavoring to control the time of ignition, caused the development to follow along other lines.



Hvid engine in cross section

The Hvid engine illustrated in cross section was one of the earliest attempts to construct an oil engine which would consume cheap fuels and afford opportunity for controlling the time of ignition. This engine employs full Diesel compression of 500 lb. or over. The fuel is measured by a low pressure fuel pump and is deposited in a small cup adjacent to the combustion chamber. During the compression stroke, the heated air enters small openings communicating with the fuel within the cup. When the temperature is high enough for ignition the mixture is exploded in the presence of a small quantity of oxygen. As the



Price oil engine

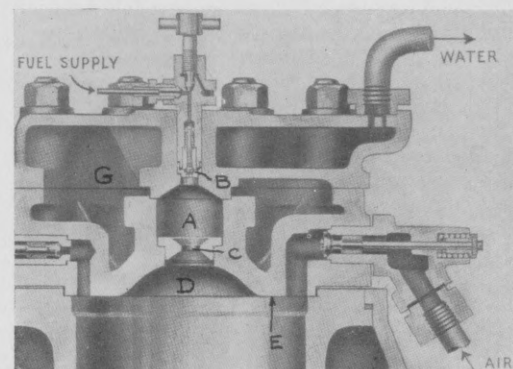
main engine piston proceeds outward on the expansion stroke, the difference in pressure between the inside of the cup and the main combustion chamber causes a flow of vaporized fuel into the cylinder. The temperature within the cylinder is at sufficient height to cause combustion to occur as rapidly as the vaporized fuel enters the combustion chamber. The difficulties with the Hvid engine occurred under light load conditions when using Diesel fuels. The tendency toward producing excessive pressures in the working cylinder proved to be detrimental to the use of this engine for widely varying loads.

The Price engine was constructed in an endeavor to regulate the maximum peak pressures under all varying load conditions. In this engine a combustion chamber is in communication with a main working cylinder through a relatively narrow opening. The combustion chamber is therefore segregated or divided. Toward the end of the compression stroke the fuel is injected into the combustion chamber through two nozzles located diametrically opposite each other. The turbulence created by the displacement of air between the cylinder head and piston head causes turbulent currents to pass through the narrow opening into the combustion chamber. These turbulent currents assist in the distribution of air and fuel in such a way as to obtain good combustion.

The divided chamber principle proved to be of sufficient merit to cause investigators to develop oil engines along these lines. Considerable importance was attached to the value of limiting the amount of piston surface exposed to the explosion pressures within a small pre-combustion chamber.

The Worthington engine is of the divided, cold combustion chamber type. No hot surfaces are used to assist in the vaporization of fuel. The fuel is sprayed into the pre-combustion chamber at about 1200 lb. pressure at

which time an explosion occurs in the presence of a limited amount of oxygen. As the piston moves outward the vaporized fuel is brought into the main combustion chamber by virtue of the difference in pressure between the pre-combustion chamber and the main combustion chamber. The vaporized fuel burns in the presence of excess oxygen in the main combustion chamber.



Worthington engine head

On the Pacific Coast a distinct type of heavy duty gas engine had been developed for workboat service, which for years proved to be very satisfactory. The demands of this service were quite severe so that rugged, substantial units were required to stand the heavy strains.

About 6 years ago when distillate was taken off the market, the heavy duty gas engine demand was suddenly cut off. An oil engine which could successfully consume cheap grades of fuel oil was therefore in demand.

Local manufacturers, sensing the future prospects, decided to develop a line of engines from 50 hp. per cylinder and under, of a type, which would satisfy the demands of Pacific Coast service and be lower in first cost than the air injection engine and of simple controls. The suggested development of this small unit was along the lines of the mechanical injection system. The 4-cyc. principle was considered particularly adaptable for this service as workboat operators were already accustomed to its operating features.

(To be continued)

Two Important Standard Works for Designers

"Oil and Gas Engines"

WHAT will be regarded by many as a highly significant addition to modern internal combustion literature is "Oel und Gasmaschinen," by H. Dubbel. The author is a professor at the Charlottenburg Technical College and has written Germany's standard mechanical engineering handbook. His latest work on internal combustion engines is being hailed as the successor to Hugo Gueldner's epochal work on the same subject. Practically all engineers in this field would agree that Dubbel's "Oil and Gas Engines" worthily succeeds, if not brilliantly surpasses, Gueldner's famous old textbook.

The binding, printing and paper stock of this book are of the highest quality. It contains 519 illustrations and 446 pages of text, the page size being 7½ in. x 11½ in.

Although Dubbel's book embraces internal combustion engines in a general way, it is focused primarily on engines of cylinder sizes considerably larger than those met with in automotive practice. That in itself would make it lean strongly towards oil engine technology, in view of the fact that the heavy-oil internal combustion machine of moderate and large capacity has of late years tended to crowd the large gas engine to the wall. Due recognition is given by Dubbel not only in

his title, but also in his treatment of the internal combustion subject throughout the book. It is a very thorough work on gas engines, but at the same time there is probably no work on oil engines that could be compared with it for excellence and completeness. It is with some hesitancy that a reviewer makes so sweeping a statement as this; but after consultation with some of the acknowledged leaders in the internal combustion engine field, it seems an injustice to say less.

With the development of airless injection, 2-cycle operation, exhaust heat reclamation, supercharging, and the perfection of marine Diesel engine types, internal combustion engine construction has in recent years experienced progress such as has been recorded at no time previous in its history. Developments of this kind have also been particularly distinguished by the fact that they have been guided by systematic research.

"Oil and Gas Engines" is intended to be a textbook for students who are acquainted with the elements of mechanics and a handbook for designers who wish to retain a comprehensive survey over their field of activity. These two objectives determined the selection and exposition of the material contained in the book.

Especially emphasis is therefore laid on the

treatment of fundamentals common to both gas and oil engines. Many mathematical derivations are determined upon not always on account of their practical value, but because of the insight which they afford into the processes covered by them. In deriving the formulae not the shortest methods, but the simplest ones are chosen and they are illustrated in detail by problems for which solutions were calculated by means of them.

Wherever the subject comes up, thorough consideration is given to the question of heat stresses on account of the highly important bearing which they are expected to have on the future development of internal combustion engines. The book is the first general textbook published so far in which there is given a mathematically correct demonstration of torsional oscillation calculating methods simple and direct enough for the average engineer to follow.

The book is obtainable through MOTORSHIP's Technical Book Department.

"Construction of the Diesel Engine"

Kamillo Koerner, it may be recalled, was one of the first authors to devote a technical scientific textbook exclusively to Diesel engines, his "Der Bau des Dieselmotors" (The Construction of Diesel Engines) having ap-

peared in its first edition in 1918. At that time the only other textbook which might have been considered capable of disputing supremacy with Koerner's work was Supino's "Land and Marine Diesel Engines."

In the preface to the second edition of "Der Bau Des Dieselmotors" Professor Koerner discloses that the first edition was originally intended to be Volume I of a two-volume work comprising respectively the constructive and theoretical aspects of Diesel engine technology. In view of the fact that the first edition was highly regarded by the engineering public, the author's present admission that "that isn't the half of it" is all the more astonishing.

Included in the Second Edition of "Der Bau des Dieselmotors" is now the second volume of theoretical and scientific matter whose publication as a separate volume had originally been contemplated. The new book, therefore, bulks correspondingly larger than the first edition, the number of pages having been increased from 349 to 531 and the number of illustrations from 500 to 744. The page size of both books is 7½ in. x 10½ in., and the Second Edition is printed on glossy paper of excellent quality. It is published in Germany by Julius Springer and may be obtained in the United States from MOTORSHIP's Technical Book Department.

It would be a mistake to infer that the Second Edition is merely the First Edition plus a scientific appendix; in fact there would be much justification for questioning whether the present work is in reality a later edition

of the first one. Possibly the chief reason why practically nothing of the original aspect of the book remains is that the author has retained only a few of his older illustrations, replacing them with a wealth of illustrative material with which the periodical press of all countries has recently depicted the astounding progress of the Diesel engine. Similarly, most of the change in the text is due to the inclusion of the newly added theoretical material with the description of constructional details, the author's avowed purpose being to keep the rational material as close to the actualities as possible.

To those who may be inclined to criticize the inclusion of mathematical deductions among the paragraphs devoted to construction and practice the answer may be made that the kernel of the constructional story lies in the illustrations to a far greater extent than it does in the text. No amount of text, as a matter of fact, could begin to equal the voluminous language that every line and circle of an engine drawing speaks to the practiced engineer and the question may, therefore, be seriously raised as to whether the inclusion of mathematical deductions along with Koerner's verbal descriptions of his illustrations will really interrupt the continuity of the book for most of its readers. On the other hand, it is not very likely that those who are interested primarily in the theoretical matter will find a really serious handicap in the author's insistence on keeping them anchored to actualities.

Stockholders also authorized an increase in the common stock from \$625,000,000 to \$750,000,000, consisting of 30,000,000 shares of \$25 par value, and eliminated the \$200,000,000 preferred stock which was recently retired. Following are the new directors:

W. S. Farish was formerly a member of Blaffer & Farish, oil producers in Texas. In 1916 the properties of this firm were merged with the Humble Oil and Refining Company, of which Mr. Farish was elected vice-president. In 1919 the Standard Oil Company purchased an interest in the Humble Oil and Refining Company, and about four years ago Mr. Farish became president. He was one of the first directors of the American Petroleum Institute, and served a term as its president.

J. A. Mowinkel was born in Venice, Italy, and entered the employ of the Standard Oil Company as a clerk in the marine department in April, 1905. During his residence in New York he became an American citizen. He has served in various capacities in the export field, and in 1916 was elected managing director of the Societa Italo-Americana pel Petrolio, an Italian subsidiary, with its head office in Genoa. He has a residence at Genoa and also at Paris.

Christy Payne for many years was counsel for various natural gas companies and a resident of Sewickley, Pa. He was transferred to New York in 1920 and is in charge of the natural gas business of the company. He resides at Stamford, Conn., and in New York City.

H. Riedemann is a son of W. A. Riedemann, founder of the Deutsche Amerikanische Petroleum Gesellschaft, a German subsidiary, with which company he became associated as a young man. Upon his father's retirement from active business, Mr. Riedemann became director general, which position he still occupies. His home is in Lucerne, Switzerland.

J. H. Senior has been in the service of the company since 1885, and has, since 1911, been associated with the West India Oil Company in South America, Central America and the West Indies. He is now the president of the West India Oil Company.

G. H. Smith entered the employ of the Standard Oil Company as a young man, and in 1914 became chief assistant to the president of the Imperial Oil Company, Ltd., of Toronto, Canada. In 1917 Mr. Smith was elected president of the International Petroleum Company, Ltd., which position he still holds, and is also a vice-president of the Imperial Oil Company.

Spears Engineers, Inc., has been awarded contract for the Diesel ferryboat for the War Department to ply between the Battery and Governor's Island. The cost will be \$207,000.

An order has been placed by an American company for a Diesel tanker with the Manitowoc S.B. Co. A Werkspoor Diesel is to be installed. When complete, the vessel will be chartered by the Roxana Pet. Co., St. Louis, for operation on the Great Lakes.

Personal

H. Akroyd Stuart, distinguished engineer prominently associated with early oil engine development, recently died in Australia. Mr. Akroyd has left a permanent memorial behind him in the \$3,500 donated to the Institute of Marine Engineers, London. The fund is to be used for a prize every 2 years for the best paper on heavy oil engine design and development. Mr. Stuart was an enthusiastic reader of MOTORSHIP since its earliest days.

Guy E. Tripp, chairman of the board of directors, Westinghouse Electric & Manufacturing Company, died on Tuesday, June 14, in the New York hospital, New York. His death was due to complications following an operation. The late Mr. Tripp was born in Wells, Maine, April 22, 1865.

J. F. Baker and *M. F. Baker* were elected president and secretary-treasurer respectively of the Foos Gas Engine Company at the meeting of the board of directors on June 15. Ray C. Burrus has been appointed sales manager, W. W. Schettler has been made chief engineer, and Geo. F. Nolte, mechanical engineer. Further, it has been decided to change the name of the company to "The Foos Engine Company." The new program of the company includes the establishment of a factory branch at Tulsa, Oklahoma. In addition to carrying a large stock of engine and parts at the Tulsa branch, the branch will include sales representatives and service engineers.

The Pacific Coast representatives, Garvey & Palmer, Inc., have practically completed the organization of that territory, having established offices in Los Angeles, San Francisco and Seattle, both the marine and stationary fields being handled by this representation.

Walter E. Thau, manager of Marine Engineering, General Engineering Department, Westinghouse Electric and Manufacturing Company, has been appointed director of Marine Engineering, according to announcement made by W. S. Rugg, vice-president of the Westinghouse Company. Mr. Thau entered upon his new duties June 1 with headquarters in New York City.

Mr. Thau, who is well known throughout marine and electrical circles because of his pioneering work in connection with the Diesel-electric propulsion of ships, in his new work, will coordinate all of the Westinghouse Company's engineering affecting the marine field and maintain engineering contact and service to the marine industry as a whole.



Walter E. Thau, appointed director of marine engineering, Westinghouse Co.

Standard Oil Directorate

Seven new directors, six of whom represent subsidiary organizations, were elected to the board of the Standard Oil Company of New Jersey at the recent annual meeting of stockholders. This, we are informed, increases the membership of the board to sixteen and marks a departure in the manner of choosing directors in that no other large industrial company carrying on a foreign business is giving such representation to its foreign units.

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